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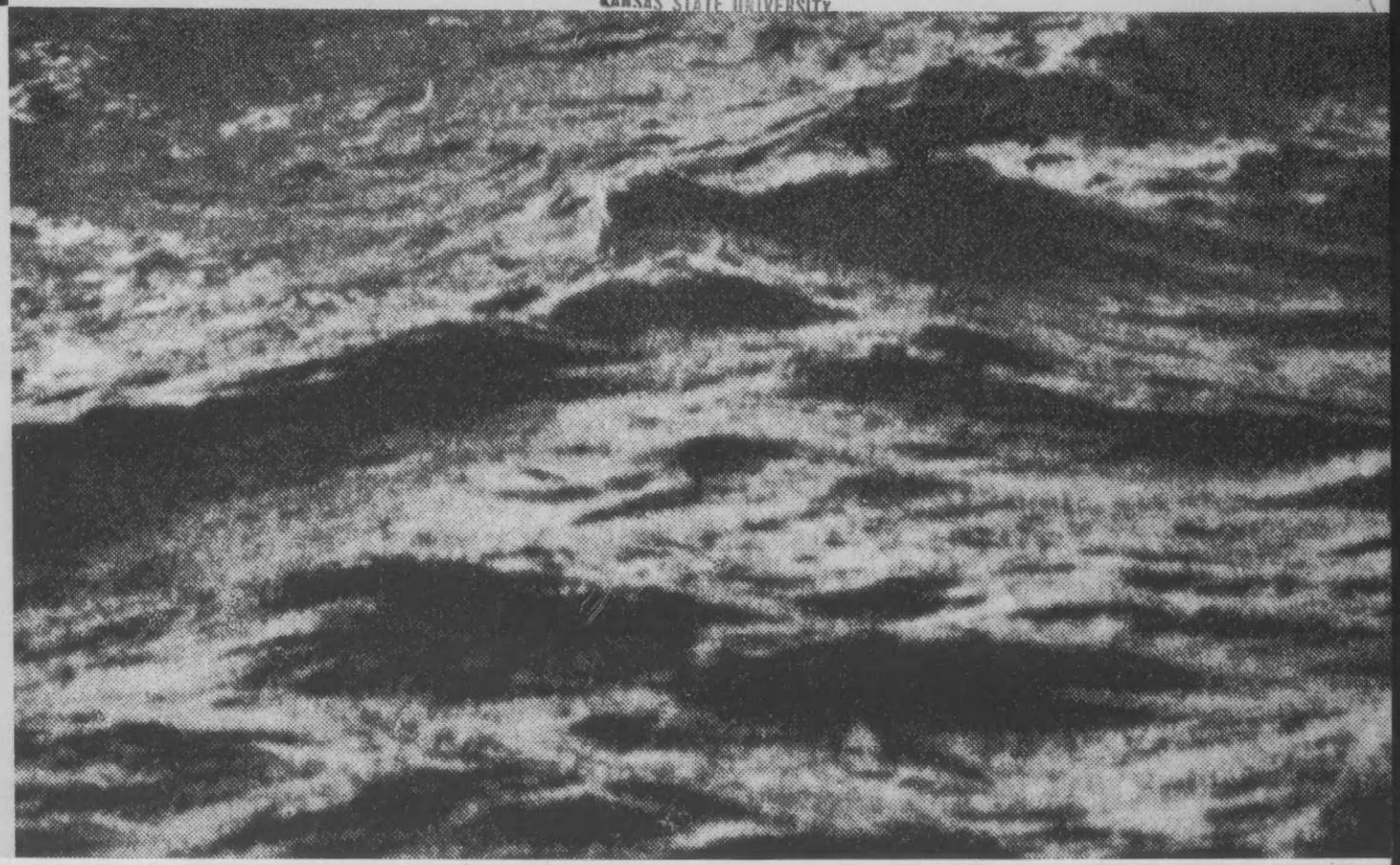

AUGUST 1972

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UNITED STATES DEPARTMENT OF COMMERCE

Peter G. Peterson, *Secretary*

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Robert M. White, *Administrator*

NATIONAL MARINE FISHERIES SERVICE

Philip M. Roedel, *Director*

FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

For sale by the Superintendent of Documents, U.S. Government Printing Office Washington, D C 20402 - Subscription price: $3.50 per year ($1.00 additional for foreign mailing). Cost per single issue - $0.35.

0.321 KINETICS OF CONFORMATION CHANGE OF SPERM-WHALE MYOGLOBIN. I. FOLDING AND UNFOLDING OF METMYOGLOBIN FOLLOWING pH JUMP

Shen, Linus L., and Jan Hermans, Jr. (Department of Biochemistry, University of North Carolina, Chapel Hill, NC 27514)
Biochemistry 11, No. 10, 1836-1841 (May 9, 1972)

Studies on the denaturation of proteins were performed to elucidate the structure of proteins in solution.

Spectrophotometric observations were made to follow the denaturation of myoglobin caused by a series of pH changes in the range of 3.0 to 4.5. Spectral shifts were observed over a period of time. From these data three states were defined: starting product, end product, and one or more transiently stable intermediates. The rates at which the intermediate products were formed were also defined. The denaturation of myoglobin was reversible with shifts in pH, while rates of transition were determined.
[3 figures, 25 references] SW

0.39 OCCURRENCE OF GABA [γ-AMINOBUTYRIC ACID] AND TAURINE IN THE NERVOUS SYSTEMS OF THE DOGFISH AND SOME INVERTEBRATES

Osborne, N. N. (Welcome Lab. Pharmacol., Univ. St. Andrews, Fife, Scotland)
Chemical Abstracts 76, No. 11, 56849v (Mar. 13, 1972)

0.321 KINETICS OF CONFORMATION CHANGE OF SPERM-WHALE MYOGLOBIN. II. CHARACTERIZATION OF THE RAPIDLY AND SLOWLY FORMED DENATURED SPECIES (D AND D*)

Shen, Linus L., and Jan Hermans, Jr. (Department of Biochemistry, University of North Carolina, Chapel Hill, NC 27514)
Biochemistry 11, No. 10, 1842-1844 (May 9, 1972)

In previous experiments on protein denaturation, intermediate states of the unfolding metmyoglobin molecule were identified. In continuing the study of the protein molecules, the structures of the intermediate states of the unfolding metmyoglobin molecule were further elucidated.
[3 figures, 8 references] SW

0.321 KINETICS OF CONFORMATION CHANGE OF SPERM-WHALE MYOGLOBIN. III. FOLDING AND UNFOLDING OF APOMYOGLOBIN AND THE SUGGESTED OVERALL MECHANISM

Shen, Linus L., and Jan Hermans, Jr. (Department of Biochemistry, University of North Carolina, Chapel Hill, NC 27514)
Biochemistry 11, No. 10, 1845-1849 (May 9, 1972)

In previous work the authors performed experiments to elucidate the structures of intermediate forms of metmyoglobin evolved during denaturation of this protein. In these experiments the rates of unfolding of derivatives of myoglobin were further defined at various pH levels.
[2 figures, 20 references] SW

0.5 (7.8) A 24-HOUR METHOD FOR THE DETECTION OF COAGULASE-POSITIVE STAPHYLOCOCCI IN FISH & SHRIMP

Insalata, N. F., C. W. Mahnke, W. G. Dunlap, and C. C. Beazley (General Foods Corporation, Post Division, Battle Creek Operations, 275 Cliff Street, Battle Creek, MI 49016)
Food Technology 26, No. 5, 78, 80-82 (May 1972)

A rapid microbiological screening method was developed for the detection of coagulase-positive staphylococci in fish and shrimp within 24 hr. of elapsed test time. The enrichment coagulase slide method is direct and sensitive. It detects coagulase-positive staphylococci in contamination levels in excess of 100 organisms per gram. The method is suitable for routine use with facilities commonly available in laboratories of the fish industry.
[1 figure, 3 tables, 13 references] FTP

0.5 (2.05) BACTERIOPHAGE AND THE TOXIGENICITY OF CLOSTRIDIUM BOTULINUM TYPE C

Eklund, M. W., F. T. Poysky, Stephanie M. Reed, and Cathy A. Smith (Technol. Lab., Natl. Mar. Fish. Serv., Seattle, Wash.)
Chemical Abstracts 76, No. 13, 69988q (Mar. 27, 1972)

0.6 THE EMULSIFYING PROPERTIES OF PURIFIED MUSCLE PROTEINS

Tsai, R., R. G. Cassens, and E. J. Briskey (Muscle Biology Laboratory, University of Wisconsin, Madison, WI 53706)
Journal of Food Science 37, No. 2, 286-288 (Mar.-Apr. 1972)

Isolated muscle proteins (myosin, actin, tropomyosin-troponin, sarcoplasmic protein) were evaluated in terms of their ability to form emulsions and of the stability of these emulsions. The emulsifying capacity of all the proteins decreased as the protein concentration increased; the emulsifying capacity of all three became equal at a concentration of 12 mg./ml. Thus, meat proteins such as myosin, actin, tropomyosin-troponin, and sarcoplasmic protein probably have equal emulsifying capacities at high concentrations. Low concentrations (2-4 mg./ml.) of sarcoplasmic protein and tropomyosin-troponin have a greater emulsifying capacity than do myosin and actin.

Core samples were prepared from protein-lipid emulsions and were cooked to determine the effect of cooking on weight change of emulsions of the specific muscle proteins. The emulsions that contained myosin showed no weight loss on cooking. The actin-containing emulsions lost some weight. Tropomyosin-troponin-containing emulsions disintegrated entirely after only a few minutes of cooking.

Mysoin formed a more stable gel after heating than did actin and the sarcoplasmic proteins.
[6 figures, 1 table, 16 references] FTP

0.4 (7.9) N-DIMETHYLNITROSAMINE IN TOBACCO SMOKE CONDENSATE

Rhoades, John W., and Donald E. Johnson (Department of Chemistry and Chemical Engineering, Southwest Research Institute, 8500 Culebra Road, San Antonio, Tex. 78284)
Nature 236, No. 5345, 307-308 (Apr. 7, 1972)

A nitrosamine (N-dimethylnitrosamine) was identified in cigarette smoke condensate using a newly developed gas chromatographic method. In addition, tobacco variety and soil growing conditions were found to be related to quantity of N-nitrosamine in cigarettes. The authors suggest that tobacco variety and soil conditions could be selected to produce cigarettes containing a minimum of N-nitrosamines. [2 figures, 1 table, 2 references] SW

0.6 (7.80) PSYCHO-PHYSICAL ANALOGUES

Morrow, C. T. (Department of Agricultural Engineering, Pennsylvania State University, University Park, PA 16802)
Food Technology 26, No. 5, 92, 94, 96, 98 (May 1972)

The author discusses the psycho-physical analogue approach to measurement of food texture. The psycho-physical analogues are defined as a model system which attempts to explain the relationship between psychological and physical measurement. [18 references] FTP

0.4 (7.10) FORMATION OF N-NITROSODIMETHYLAMINE FROM NATURALLY OCCURRING QUATERNARY AMMONIUM COMPOUNDS AND TERTIARY AMINES

Fiddler, Walter, John W. Pensabene, Robert C. Doerr, and Aaron E. Wasserman (Eastern Marketing and Nutrition Research Division, Agricultural Research Service, U.S. Department of Agriculture, Philadelphia, PA 19118)
Nature 236, No. 5345, 307 (Apr. 7, 1972)

Food products as potential sources of nitrosamines (carcinogenic in laboratory animals) are causing concern. A nitrosamine (dimethylnitrosamine) was formed from several quaternary ammonium compounds and related tertiary amines in conditions simulating those found in preserved, minced meat products containing sodium nitrite. The authors suggest that the tertiary amines and free secondary amines in food products as specific sources of nitrosamines must be considered. [1 table, 4 references] SW

0.5 (2.05) INTERACTION OF SODIUM NITRATE [sic], OXYGEN AND pH ON GROWTH OF STAPHYLOCOCCUS AUREUS

Buchanan, Robert L., and Myron Solberg (Department of Food Science, College of Agriculture & Environmental Science, Rutgers, The State University, New Brunswick, NJ 08903)
Journal of Food Science 37, No. 1, 81-85 (Jan.-Feb. 1972)

Sodium nitrite serves as a color fixative and preservative in cured meats. Earlier work has shown that sodium nitrite inhibits growth of a variety of bacteria in fish muscle under initial acidic pH conditions. There is, however, the potential for nitrite to participate in the formation of nitrosamines. For this reason, it is necessary to obtain a complete understanding of the function of nitrite in foods to establish safe usage levels. Earlier work has shown that pH and oxygen pressure influence the bacteriostatic action of sodium nitrite toward S. aureus. The purpose of the present study, therefore, was to determine the effects and interactions of sodium nitrite (in concentrations of 200, 500, 1,000, and 2,000 p.p.m.), initial pH (6.3 and 7.3), and partial pressure of oxygen (0 and 160 mm Hg) on the growth of a food-poisoning strain of S. aureus in broth (Brain-Heart Infusion) cultures.

Sodium nitrite inhibited S. aureus by extending the adjustment phase, by decreasing the rate of growth, and by damaging or destroying the cells. The magnitude of this inhibition depended upon the concentration of sodium nitrite, the initial pH, and the partial pressure of oxygen. Under aerobic conditions, S. aureus metabolizes nitrite; under anaerobic conditions, the level of nitrite remains unchanged. Aerobic cultures of S. aureus show an initial decrease in pH, then a rise in pH to a level greater than the initial pH. Anaerobic cultures of the organism show a decrease in pH and then remain at the maximum pH decrease level. [6 figures, 27 references] FTP

0.4 (6.54) PROTEIN PRODUCTS

Unilever Ltd. (M.P. Tombs) (pat.)
British Patent 1,265,661
BFMIRA Abstracts 25, No. 5, Abstract No. 1877, 380 (May 1972)

Spun textured vegetable protein products are produced from a protein "mesophase" instead of the alkaline spinning dope previously used. This mesophase is prepared by suspending the protein in a salt solution and has the advantage that high pH is not used which could cause denaturation of the protein. Reprinted

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0.4 N-NITROSAMINES, FACT AND FICTION

Schuiler, P. L.
Voeding 33, No. 2, 76-92 (1972) (In Dutch)
BFMIRA Abstracts 25, No. 5, Abstract No. 1702, 345 (May 1972)

A comprehensive literature review with 159 references is presented. C.S.B. Reprinted

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0.4 (1.11) ANTIBACTERIAL AND STAPHYLOCOCCICIDAL MEDICINE

Gheorghe, Vasile, Manole Cucu, Marioara Manea, and Elena Andronache (Institutul de Igiena si Sanatate Publica Bucuresti) (pat.)
German Offen. (Patent) 2,128,249 (Dec. 30, 1971)
Chemical Abstracts 76, No. 20, 117496b (May 15, 1972)

0.6 CHANGES IN THE LIPID SOLUBLE CARBONYLS OF BEEF MUSCLE DURING AGING

Sink, J. D., and P. W. Smith (Division of Food Science & Industry, Pennsylvania State University, University Park, PA 16802)
Journal of Food Science 37, No. 1, 181-182 (Jan.-Feb. 1972)

The data reported in this article represents part of a study of the flavor components of beef muscle. Samples of the longissimus dorsi muscle of a steer were excised from the rib after exsanguination (0-day), and after 3, 8, and 14 days of aging at 3° C. Analysis for carbonyls were made on the hexane extracts of the muscle.

The total carbonyl content, as well as the amount of monocarbonyls, increased during aging of the muscle. The monocarbonyls accounted for about 35% to 40% of the total carbonyls present; the methyl ketones constituted about 75% to 87% of the monocarbonyls. The significance of these findings to the flavor of the beef muscle has not been determined, but the authors are working to determine the specific chemical composition of each carbonyl fraction and to relate these observations to taste panel evaluations of the cooked meat samples. The data are summarized in the table that follows.

(over)

0.8 USABLE WATER FROM RAW SEWAGE
(9.19)

Woodbridge, David D., Leland A. Mann, and William R. Garrett (University Center for Pollution Research of Florida Institute of Technology, Melbourne, Fla. and Energy Systems, Inc., Melbourne)
Bulletin of Environmental Contamination and Toxicology 7, No. 2/3, 80-86 (Feb.-Mar. 1972)

The authors predict that by the year 2020, the demand for fresh water in the United States will exceed the supply. Today, water is being wasted and the conventional sewage treatment plant is an example of this wastefulness. Chemical treatment of sewage, for example, merely exchanges one type of pollution for another type. With these considerations in mind, the authors investigated the use of nuclear irradiation treatment of sewage. A pilot irradiation treatment plant was developed at the University Center for Pollution Research of the Florida Institute of Technology and a small commercial treatment plant was installed at a campground in Palmdale, Fla. Cobalt-60 was used as the irradiation source.

After 3 years of operation of the test facility at the University Center for Pollution Research and 1 year of operation of the commercial facility the authors concluded that usable water can be obtained by irradiation treatment of raw sewage. The unfiltered effluent from irradiation-treated sewage could be used directly for irrigation purposes. The effluent contained no residual pollutant; it was odorless; the organic content of the effluent had been broken down; the effluent contained few of the bacteria and viruses originally present in the sewage;

(over)

0.6 COLORING FOODS WITH CAROTENOIDS

Gordon, Howard T. (Roche Chemical Division, Hoffmann-La Roche Inc., Nutley, NJ 07110)
Food Technology 26, No. 5, 64, 66 (May 1972)

Fruits, vegetables, dairy products, shrimp, lobster, and leaves contain carotenoids. These natural pigments range in color from light yellow to dark red. Over 100 carotenoids have been identified and almost all of them have been synthesized in the laboratory. Three are commercially available in the United States--beta carotene, apo-carotenal, and canthaxanthin. The three are permanently listed Food and Drug Administration approved additives that do not require batch certification.

Beta carotene is light yellow to orange; apo-carotenal is light orange to reddish orange; and canthaxanthin is tomato red. All three are insoluble in water at 75° F. At the same temperature, they are slightly soluble in ethanol and in vegetable oils and fairly soluble in chloroform. Beta carotene shows 1,666,667 I.U./g. of vitamin A activity; apo-carotenal shows 1,200,000 I.U./g.; but canthaxanthin shows none.

The advantages of using the carotenoids to color foods are as follows: (1) They are not affected by reducing substances in foods such as ascorbic acid. (2) They simulate natural colors better than do azo dyes. (3) They are stable in the pH ranges found in foods. (4) Beta carotene and apo-carotenal have provitamin A activity. (5) Because they are synthetically prepared, supply and quality problems are minimized.

(over)

1.0116 THE STATUS OF THE SCIAENID STOCKS OF THE MIDDLE ATLANTIC COAST
(1.9)

Joseph, Edwin B. (Virginia Institute of Marine Science, Gloucester Point, VA 23062)
Chesapeake Science 13, No. 2, 87-100 (June 1972)

Population trends of the Atlantic croaker (Micropogon undulatus), the weakfish (Cynoscion regalis), and the spot (Leiostomus xanthurus) were described from historical catch records. Croaker populations north of Cape Hatteras increased from low levels at the beginning of the century to a high level in the early 1940's, but declined precipitously thereafter. The author suggests that climatic factors rather than overfishing caused the change.

Weakfish stocks were high at the beginning of the century and up to the 1930's. The steep decline since that time may be related to overexploitation in part, but it may also have been influenced by widespread use of DDT.

Stocks of spot, the author suggests, have declined in the northern part of the range, but populations in Chesapeake Bay show only random year-to-year fluctuations typical of short-lived cycle species.

[6 figures, 3 tables, 22 references] SW

0.8 (9.16)(9.2)

SYSTEMS ENGINEERING OF OYSTER PRODUCTION. OPTIMIZATION OF AN OYSTER PRODUCTION SYSTEM IN THE PRESENCE OF UNCERTAINTY

Costello, Frederick A., and Brent L. Marsh (College of Engineering, University of Delaware, Newark, DE 19711)
Publication No. 2EN066, College of Marine Studies, University of Delaware, Newark, DE 19711 (May 1972), 55 pp.

The authors prepared a model of a closed-cycle system for rearing commercially valuable oysters. The work is based on research carried out on the stochastic optimization (that is, optimization in the presence of uncertainty) for a closed-environment oyster production facility. They considered three types of uncertainty important to the oyster production system as follows: (1) uncertainty in primary system process parameters, (2) uncertainty in design variables, and (3) uncertainty in subsystem process functional relations. The appendix consisted of: Part I Automated Systems Analysis Program, Part II Output from Systems Analysis Program (Listing of Algae System Simulation Program, Listing of Variables Found in Algae Program, Summary of Cost Variables and Relation to Independent Variables).
[2 tables] FTP

0.6

THE DETERMINATION OF THE WATER-BINDING CAPACITY OF MEAT AND THE STATISTICAL EVALUATION OF THE RESULTS

Brendl, J., and S. Klein
Dt. LebensmittelRdsch. 67, No. 10, 353-356 (1971) (In German, English summary)
BFMIRA Abstracts 25, No. 1, Abstract No. 181, 38 (Jan. 1972)

A modified compression method for the determination of the water-binding capacity of meat is described. A detailed statistical analysis of the results is given. C.S.B. Reprinted

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0.6

PROCESSING DAMAGE TO PROTEIN FOODS

(0.7)

Bender, A. E.
PAG Bull. [FAO/WHO/UNICEF, United Nations, New York, N.Y.], 2, No. 1, 10-19 (1971)
BFMIRA Abstracts 25, No. 5, Abstract No. 1673, 339-340 (May 1972)

This paper was originally presented at the 18th PAG meeting held in Rome during 1971. The author emphasizes that three factors must be considered when examining the effect of processing on proteins. These are that changes in nutritive value are unimportant if the food is a minor part of the diet, inadequate methods of assessing nutritive value may lead to wrong conclusions and since the nutritive value of many diets is limited by sulphur amino acids, the Maillard reaction involving lysine is of little significance. The most important factors in processing damage are heat, the presence of moisture and reducing substances. Little damage occurs during normal home cooking of foods but poor control of some manufacturing conditions can lead to extensive damage in commercially processed protein foods. L.P. Reprinted

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2.05

FOOD POISONING DUE TO BACTERIOLOGICALLY CONTAMINATED FOOD

Kendereski, S.
Fleischwirtschaft 51, No. 9, 1326-1328 (1971) (In German, English summary)
BFMIRA Abstracts 25, No. 1, Abstract No. 112, 24 (Jan. 1972)

A general review of food poisoning caused by micro-organisms is presented with 29 references. C.S.B. Reprinted

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[2 tables] FTP

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0.8 (9.19)

Irradiation treatment of raw sewage can be applied advantageously in parks and other camp areas where the effluent can be effectively used for irrigation. The effluent would have to be filtered if used for industrial purposes or if returned to the original stream.
[2 figures, 1 table] FTP

0.6

Carbonyl compounds	Amount (μM/g lipid) of carbonyl compounds isolated from beef rib muscle aged at 3° C. for:			
	0 days	3 days	8 days	14 days
Total carbonyls	6.50	11.02	11.61	17.94
Monocarbonyls	1.69	4.51	4.46	6.26
Methyl ketones	0.89	3.82	3.78	5.44
Alkanals	0.00	0.02	0.02	0.03
Alk-2-enals	0.04	0.02	0.02	0.01

[1 figure, 1 table, 14 references] FTP

0.6 (0.7)

The disadvantages of using the carotenoids to color foods are as follows: (1) They do not cover the full range of colors--only yellow to orange to red. (2) Some of the forms are slightly inconvenient to use. For these forms, the use of stock solutions prepared daily is recommended. (3) They are more expensive in most uses than are competitive colors.
[1 table] FTP

2.05 (0.5)

INFLUENCE OF WEIGHT AND SEX OF MICE IN ASSAYING SPORE-BOUND CLOSTRIDIUM BOTULINUM TYPE A TOXIN

Booth, Ron, Jon B. Suzuki, Pat E. Berg, and Nicholas Greez (Biophysics Laboratory, Department of Biology, Illinois Institute of Technology, Chicago, IL 60616)
Journal of Food Science 37, No. 1, 183-184 (Jan.-Feb. 1972)

Swiss white mice ranging in weight from 20 to 40 grams were injected intraperitoneally with a suspension containing C. botulinum 33A (5×10^8 spores per ml.) or (1,200 MLD/ml. of spore-bound toxin). The 20 g. mice were more sensitive to the spore toxin than were the heavier mice. Mice of different sex showed no significant difference in their response to the spore toxin. The authors suggest that initial steps of liberation and absorption of spore-bound toxin are different from those occurring after injections of free botulinum toxin.
[1 table, 7 references] FTP

2.110 MORE NEW SHIPS FOLLOW 'VOSTOK' INTO USSR FLEET

Young, Edgar P.
Fishing News International 11, No. 5, 58-61 (May 1972)

The mothership Vostok was completed in December 1971 and is now operating with her fleet of 14 catcher vessels in the middle Atlantic. In the same month, the prototype of five large ships designed mainly for the production of fish meal at sea was launched in a U.S.S.R. shipyard. This new vessel, called the Pos'yet was described in the January 1972 issue of the magazine Sudostroyeniye (Shipbuilding). In the February 1972 issue of the magazine a new Meridian class stern trawler was described. The present article describes the Pos'yet and Meridian vessels based on the information contained in the two articles in Sudostroyeniye.

The Meridian is a shelter-deck factory stern trawler. It was intended for operation in medium latitudes but is suitable for work in tropical waters. The Meridian is designed to fish for and process cod, hake, turbot, sea bream, herring, and sardines. The fish are frozen aboard as whole fish or fillets. Waste fish and offal are processed into fish meal and oil.

The factoryship Pos'yet is intended to operate in conjunction with a fleet of catcher vessels. She will be able to produce fish meal and oil, and to process fish into skinned frozen fillets, whole frozen fish, roe, frozen fish paste, and vitamin A oil. The Pos'yet and four sister ships appear to be destined for the Soviet Far East Fleet. Mintai or Alaska pollock will probably be the main source of raw material. Basic specifications on the two vessels are shown in the table that follows.

(over)

2.116 ESTIMATION OF THE PACIFIC HAKE (MERLUCCIUS PRODUCTUS) POPULATION IN PORT SUSAN, WASHINGTON, USING AN ECHO INTEGRATOR

Thorne, Richard E., Jerry E. Reeves, and Alan E. Millikan (Fisheries Research Institute, College of Fisheries, University of Washington, Seattle, WA 98195)
Journal of the Fisheries Research Board of Canada 28, No. 9, 1275-1284 (Sept. 1971)

The procedures for estimating abundance of fish based echogram marks or echo traces from schools are often subjective because of difficulties in interpreting echo indications.

An acoustical census of the hake in Port Susan was undertaken. The objectives were to obtain an estimate of the spawning population for management purposes, to evaluate the echo integrator as a tool for estimating fish population and to develop techniques for future enumeration of hake in Port Susan. The hake stock of Port Susan was selected for study because ecological, fishery, biological, and genetic data are available for reference. Estimates of hake population in Port Susan prepared in 1969 were compared to estimates accomplished in 1970. The 1969 estimates were based on use of a simple voltage integrator. The 1970 estimate utilized a voltage squared integrator which increased objectivity and enabled estimation of confidence levels. The acoustical estimates were calibrated to net hauls. The comparison between 1969 and 1970 estimates indicated a decrease in spawning stock size. The decrease was attributed to variation of stock present in Port Susan, at the time of the census, and not to overfishing.
[5 figures, 2 tables, 17 references] SW

2.116 (2.146) INVESTIGATIONS INTO THE RELATION BETWEEN INTEGRATED ECHO VOLTAGE AND FISH DENSITY

Thorne, Richard E. (Fisheries Research Institute, College of Fisheries, University of Washington, Seattle, WA 98195)
Journal of the Fisheries Research Board of Canada 28, No. 9, 1269-1273 (Sept. 1971)

Commercial fish populations have been estimated traditionally either directly by recovery of marked fish or indirectly from catch per unit of effort. To reduce the effort and money required by these methods use of acoustic equipment provides a promising alternative. The output from integrators is translated into numbers of fish. These instruments cannot distinguish single from mutiple targets, thus the number of fish counted will be an underestimate if the fish are densely concentrated. Two modifications of an echo integrator design were investigated to determine if they could be utilized in estimating fish density more accurately. An echo integrator works with an echo sounder to measure the total voltage of echoes received from a given depth and sums the voltages over time. Density of fish and instrument estimates were compared with catches using midwater trawls. Sockeye salmon (Oncorhynchus nerka) were netted in Lake Washington. Pacific herring (Clupea harengus pallasi) and Pacific hake (Merluccius productus) were netted in Puget Sound. In the tests with salmon, modification number one of the echo integrator design was used in which the signal from the echo sounder was taken from the stylus output. There was no time-varied-gain (TVG) circuit in the modification. The initial catches were small; the highest densities were below one fish per pulse. Integration and net catch were linearly related. In later high-density catches relation to integration deviated from linearity and related more to

(over)

2.119 MARINE TECHNICIANS HANDBOOK PROCEDURES FOR SHIPBOARD DIVING AND THE UNIVERSITY GUIDE FOR DIVING SAFETY

[Authors as indicated below]
Sea Grant Publication No. 15, Institute of Marine Resources, P.O. Box 109, La Jolla, CA 92037 (Nov. 1971), 23 + E4 + S4 pp. Price $1.25.

The "Procedures for Shipboard Diving" were prepared by James R. Stewart (Scripps Institution of Oceanography, La Jolla, Calif.). The "University Guide for Diving Safety" was promulgated by the University Conference of Environmental Health and Safety Officers. The Guide was prepared to assist all university institutions in developing underwater safety programs that will foster reciprocity of diver certification among the institutions.

The report is divided into three parts. Part I is the "University Guide for Diving Safety." Part II is the "Emergency Procedures for University Divers in the La Jolla Area." Part III is the "Marine Technician's Handbook Procedures for Shipboard Diving." FTP

2.9 PHARMACOLOGICAL PROPERTIES OF THE VENOM OF THE SCORPIONFISH SCORPAENA GUTTATA

Carlson, Richard W., Richard C. Schaeffer, Jr., Ronald G. La Grange, Carmel H. Roberts, and Findlay E. Russell (Sch. Med., Univ. South. California, Los Angeles, Calif.)
Chemical Abstracts 76, No. 5, 21758n (Jan. 31, 1972)

2.116

the square of the voltage. In test trawls for herring, model number two of the echo integrator design was used. This modification included a TVG circuit which amplified the signal voltage in proportion to depth to equalize echoes from fish at different distances. The signal was taken from the IF part of the echo sounder, rectified, amplified and put through to the integrator, peak detector, and pulse counter. The herring catch at night indicated high density and the relation to integration was linear. Catches during the day were also linearly related to integration, but the data indicated that the fish were clustered in isolated schools. At night the fish were uniformly dispersed. Catch and integration data on hake were obtained after corrections for noise. Model number two was used during these trawls. The relation of catch and integration was not linear because over one fish per pulse was calculated.

The authors concluded that when fish density is uniform the relation of fish density and integrated voltage will be linear to a density of exactly one fish per pulse and related to the square of voltage at higher densities. Further, the overall density relation to integrated voltage depends primarily on the number and size of schools encountered rather than on the density of fish within schools. [9 figures, 15 references] SW

Visceral material is separated from shucked clam meats. FTP

U.S. Patent 3,659,315 (May 2, 1972)
Nicholson (Lewes, DE 19958); assignors to HCA Food Corp., Baltimore, Md.(pat.)
Finley, Ronald K. (Towson, Md.), Donald J. Langlois (Pasadena, Md.), and Robert H.

2.3 PROCESS OF CLAM EVISCERATION

2.110

Item	Freezer trawler Meridian	Factoryship Pos'yet
Length, o.a.	103.1 m.	197.3 m.
Length, w.l.	97.2 m.	--
Length, b.p.	94 m.	182 m.
Breadth	16 m.	26.4 m.
Depth to upper deck	10.2 m.	14.5 m.
Draught	5.8 m.	--
Displacement	5,600 tons (max.)	27,500 tons (light)
Deadweight	1,980 tons	--
Main engines	2×3,000 hp.	1×9,000 hp.
Maximum speed	16 knots	14.5 knots
Complement	93	506
Fuel oil	--	8,000 tons
Endurance	--	30 days

[Contains diagrams of the profile and general arrangement of the freezer stern trawler Meridian and the processing base ship Pos'yet.] FTP

2.12 EXPLORATORY FISHING FOR THE SUNRAY VENUS CLAM, MACROCALLISTA NIMBOSA, IN NORTHWEST FLORIDA

Jolley, John W., Jr. (Florida Department of Natural Resources Marine Research Laboratory, P.O. Drawer F, St. Petersburg, FL 33731)
State of Florida Department of Natural Resources, Technical Series No. 67, 41 pp. (Jan. 1972)

Exploratory fishing to locate commercially significant beds of the sunray venus clam, Macrocallista nimbosa (Solander), and to survey benthic fauna from 68 ft. shoreward was conducted with a 48-in. hydraulic Nantucket clam dredge. Sampling was dependent on mild weather and was usually confined to sandy substrates. One hundred and seventy-three stations were established from the Alabama-Florida boundary line to Cedar Keys with five additional stations in southwest Florida.

The most abundant and frequently caught clam was the sunray venus: 95% were taken in depths of 10 to 40 ft. and the catch was highest at 10 to 15 ft. It was taken predominantly in sandy substrates. Although the areas dredged near Panama City and Cedar Keys yielded smaller catches than those at commercial grounds on Bell Shoal, they warrant further investigation. Offshore investigations in depths of 41-68 ft. showed no evidence of other potentially commercial clam stocks. Paucity of small sunrays (less than 126 mm.) tends to substantiate the hypothesis that subadults may move from inshore to offshore areas.

More than 140 species of fish and invertebrates were identified from catches; faunal associations varied with depth in some areas. Several benthic species were found commonly associated with sunrays, and a predatory relationship is suggested for two species. Results at Cedar Keys indicated that the hydraulic Nantucket dredge should not be used in areas where grass beds are an important part of the environment. [21 figures, 4 tables, 18 references] SW

2.116 AN EXPRESSION FOR THE VARIANCE OF ABUNDANCE ESTIMATES USING A FISH ECHO INTEGRATOR

Moose, Paul H. (Marine Acoustics Program, Division of Marine Resources, and Applied Physics Laboratory, University of Washington, Seattle, WA 98195), and John E. Ehrenberg (Department of Electrical Engineering, University of Washington, Seattle, WA 98195)
Journal of the Fisheries Research Board of Canada 28, No. 9, 1293-1301 (Sept. 1971)

A mathematical model of a fish echo integrator was prepared to analyze and determine expressions for variations in performance of the apparatus. Based upon the analysis, procedures for operation of the echo integrator were suggested to obtain optimum estimates of fish density.
[3 figures, 6 references] SW

Flavor-producing constituents of meat are extracted with water from the practically fat-free comminuted meat. The aqueous solution is subjected to dialysis and chromatographic fractionation to yield the flavor-producing materials. FTP

2.06 MEAT FLAVOR CONCENTRATES

Mabrouk, A. F., and J. K. Jarboe; U.S. Department of the Army (pat.)
U.S. Patent 3,634,097
Food Technology 26, No. 5, 111 (May 1972)

2.43 STORAGE LIFE OF PREPACKED WET FISH AT 0°C.
I. PLAICE AND HADDOCK

Huss, H. H. (Technological Laboratory, Ministry of Fisheries, Lyngby, Denmark)
Journal of Food Technology 7, No. 1, 13-19 (Mar. 1972)

These experiments were carried out to determine the effect of packaging on the keeping quality of fish stored at 0° C. Plaice and haddock, not more than 2 to 3 days on ice, were gutted and then individually packed in low-density polyethylene (0.07 mm.) and polyamide (nylon 11) (0.04 mm.) pouches. The pouches were heat sealed and the filled bags were stored in wet ice. The polyamide bags were vacuum packed; the polyethylene bags were packed without vacuum and with vacuum. Some gutted fish were stored in wet ice without wrappers--these fish served as control samples. During periodic intervals of storage, sample bags of fish and samples of the control lot of fish were removed and examined for (1) levels of oxygen and carbon dioxide partial pressure inside the bag (Additional fish samples were packed with 25 ml. of cold, newly boiled water. The oxygen and carbon dioxide partial pressures were determined electro-chemically on the water phase.), (2) total aerobic bacterial count, (3) organoleptic quality, (4) measurement of total volatile base N (TVB), and (5) pH value.

The packaging did not cause any decrease in quality or keeping time of the plaice and haddock stored at 0° C. In some instances, an improvement was noted depending upon the species of fish and on the packaging material and method used.

(over)

2.6 ECONOMICS OF SURPLUS HATCHERY SALMON DISPOSAL IN OREGON
(3.26)(9.2)

Roberts, Kenneth J.
Commercial Fishing Publication, Sea Grant No. 17, 20 pp. (n.d.) (Oregon State University Extension Marine Advisory Program, Corvallis, OR 97331)

The Fish Commission of Oregon (FCO) has been selling surplus hatchery salmon since 1964. Before 1964 all the salmon that returned to the hatcheries were used for eggs and sperm required to expand the hatchery program. Starting in 1964 more salmon returned to the hatcheries than were needed for egg production. These surplus salmon were sold through bids by the FCO without grading which would restrict the best quality for human consumption. In 1971 surplus salmon were classified in one of three grades. The top two grades were for human consumption and the third for nonhuman consumption.

The FCO has received comments that: (1) surplus hatchery salmon is of poor quality and hurts the market; (2) a public agency should not be in the fish business; (3) surplus hatchery salmon in the market lowers the price of commercially caught salmon.

This study analyzed the marketing of salmon in relation to the complaints and provided the following information. Until 1970 the amount of surplus salmon sold by the FCO and used for human consumption was 4.70% of the commercial catch (assuming that all of it is used for human consumption). In 1971, when the FCO began grading surplus salmon before sale, 2.98% of the commercial catch was used for human consumption. The author observes that such a small proportion of the commercial catch would have a small or no effect on the market price of salmon. With

(over)

2.43 STORAGE LIFE OF PREPACKED WET FISH AT 0°C.
II. TROUT AND HERRING

Hansen, Poul (Technological Laboratory Ministry of Fisheries, Lyngby, Denmark)
Journal of Food Technology 7, No. 1, 21-26 (Mar. 1972)

Part I of this series, ibid. pp. 13-19, deals with plaice and haddock. Tests were carried out to determine the effect of packaging on the keeping quality of these fish stored at 0° C. In this study, trout Salmo irideus and herring Clupea harengus were used. The fish were taken from the water, gutted, and experimentally packed in 1 day. The gutted trout were packed heads-on; the gutted herring were packed with heads-off. The lots of trout and of herring were packed into four test groups: (1) vacuum packed in airtight films [polyamide (0.04 mm.) or a saran-coated polyester/polyethylene laminate], (2) vacuum packed in polyethylene films (low density, 0.04 or 0.07 mm.), (3) packed in polyethylene films without vacuum, and (4) control--the fish were not packaged. The bags of fish and the unpackaged fish were held in ice (0° C.). Water was added to additional samples of prepackaged fish for use in the electrometric measurements of partial pressure of oxygen inside the pouch. Sample pouches of the fish and samples of the control lot of fish were removed during periodic intervals of storage and examined for (1) partial pressure of oxygen inside the pouch, (2) total aerobic bacterial count, (3) peroxide value, and (4) organoleptic quality.

The keeping quality in wet ice of gutted trout and herring packed in pouches depended upon the access of atmospheric air to the surfaces of the fish during storage. The fish packed loosely in polyethylene pouches showed oxidation of fat and rancidity early in the storage period because of easy access of air to the fish.

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3.15 RADIATION PRESERVATION OF TROPICAL SHRIMP FOR AMBIENT TEMPERATURE STORAGE. 1. DEVELOPMENT OF A HEAT-RADIATION COMBINATION PROCESS

Savagaon, K. A., V. Venugopal, S. V. Kamat, U. S. Kumta, and A. Sreenivasan (Biochemistry & Food Technology Div., Bhabha Atomic Research Centre, Trombay, Bombay 85, India)
Journal of Food Science 37, No. 1, 148-150 (Jan.-Feb. 1972)

Earlier work has shown that good quality food products can be preserved by integrating radiation treatment with thermal treatment to inactivate the enzymes, vacuum packaging in suitable containers to arrest oxidative changes, and irradiation at low temperatures to prevent damage to tissue constituents. The cost of food products for general consumer use prepared by this multistep process would appear prohibitive.

In this study, the authors examined alternate low-cost combination treatments using low-dose irradiation (100-300 Krad) and heat treatments that would adequately preserve food products stored at ambient temperatures. To assess the efficacy of the heat-radiation treatment, inoculated pack studies were carried out using Clostridium sporogenes. Polycell pouches (polyethylene 150 gauge/cellophane 100 gauge) were used to package the shrimp.

Three processes were developed. The processes and storage test results are summarized in the following table.

(over)

2.43

The storage life of these fish is limited by the rate of oxidative rancidity. Under the conditions described, storage life was about 1 week. The storage life of the fish vacuum packed in polyethylene films was about twice that of fish packed in polyethylene films without vacuum. A combination of the development of rancidity and of microbiological spoilage limits the storage life of herring and trout vacuum packed in polyethylene pouches and stored in wet ice. Trout vacuum packed in polyethylene bags had a storage life in wet ice of about 3 weeks; those packed in polyethylene bags without vacuum and those packed directly in ice had a storage life of from 7 to 10 days. Herring vacuum packed in polyethylene bags had a storage life of 15 days in wet ice; those packed in polyethylene bags without vacuum and those packed directly in wet ice had a storage life of about 6 days. FTP

[4 figures, 4 references]

3.15

Sample of shrimp	Processing treatment				Shelf life of treated shrimp at 28°-30° C.
	Heating			Radiation dose	
	Method	Temp.	Time		
		°C.	min.	Krad	
Control:					
1	Steam	100	15	0	1-2 days
2	Steam, pressure	109	20	0	2-5 days
3	Steam, pressure	121	8	0	3-15 days
Test:					
1	Steam	100	15	350	6-8 weeks
2	Steam, pressure	109	20	200	6-8 weeks
3	Steam, pressure	121	8	100	6-8 weeks

Inoculated pack tests using spores of C. sporogenes at 10^2 and 10^6 per g. levels indicated that the product was safe from the bacterial standpoint. The polycell pouches seemed to induce adverse changes in the organoleptic qualities of stored shrimp, so the authors propose the use of packaging material more stable to irradiation treatment. They suggest materials such as nylon-6, polyethylene, poly(ethylene-terephthalate), and poly(vinyl chloride-vinyl acetate). The third test sample process (with the cooking time of 8 min. at 121° C.) gave a product with better appearance than did the products prepared by the other two test procedures. [2 figures, 3 tables, 14 references] FTP

3.15 (0.7) DAMAGE TO THE NERVOUS SYSTEM CAUSED BY IRRADIATED FOODS. THIS IS WHAT ANIMAL TESTS IN FRANKFURT HAVE SHOWN

Steinert, H.
Handelsblatt Düsseldorf p. 30 (Feb. 17, 1972) (In German)
BFMIRA Abstracts 25, No. 5, Abstract No. 1697, 344 (May 1972)

Fish marinades were subjected to 160 and 480 Krad and fed to rats. The results indicated that irradiation at these levels could cause damage to the central nervous system of persons consuming the irradiated food. The work was carried out at the Battelle Institute in Frankfurt. C.S.B. Reprinted

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2.43

Evacuation of the polyethylene pouches did not cause any significant change in the oxygen and carbon dioxide levels around the fish. The author concludes, therefore, that vacuum-packaging fish in polyethylene bags does not contribute to creating the necessary growth conditions for anaerobic bacteria. FTP

[5 figures, 7 references]

2.43 REDUCING THE TOXICITY OF FOOD PACKAGING PLASTICS

Petrovskii, K. S., and D. D. Braun (Moskovskii. Med. Inst. im. Sechenova, Moscow, U.S.S.R.)
Chemical Abstracts 76, No. 22, 128219q (May 29, 1972)

2.06 COOKED MEAT PRODUCT

Ackroyd, H. B.; Scot Meat Products Ltd. (pat.)
U.S. Patent 3,638,554
Food Technology 26, No. 5, 111 (May 1972)

Meat is compressed in an evacuated trough into a unit of the desired cross section. The unit is then slid into a container and cooled while compression is maintained. FTP

2.6 (3.26)(9.2)

regard to the quality of surplus salmon, the grading program prior to sale has reduced the possibility of poor quality fish in the market for human consumption. In the matter of a public agency not being in the fish business, the public is already in the fish business by providing hatcheries as a fisheries resource. Fish that are surplus to the resource should be disposed of in a manner that will benefit the public. [1 figure, 7 tables] SW

3.15 RADIATION PRESERVATION OF TROPICAL SHRIMP FOR AMBIENT TEMPERATURE STORAGE. 2. STORAGE STUDIES

Savagaon, K. A., V. Venugopal, S. V. Kamat, U. S. Kumta, and A. Sreenivasan (Biochemistry & Food Technology Div., Bhabha Atomic Research Centre, Trombay, Bombay 85, India)
Journal of Food Science 37, No. 1, 151-153 (Jan.-Feb. 1972)

In part 1 of this series, the authors described a heat-radiation combination process that preserves shrimp packaged in polycell pouches for 6 to 8 weeks at ambient temperature (28°-30° C.). In this second part, they determined the storage (room temperature) properties of shrimp processed and packaged by the proposed heat-radiation combination method. The effects of processing and storage on the shrimp were evaluated organoleptically; by means of objective tests for trimethylamine (TMA), thiobarbituric acid (TBA), free fatty acids (FFA), total volatile basic nitrogen (TVBN), and peroxides; and by the determinations of total and free amino acids and level of certain vitamins (ascorbic acid, thiamine, riboflavin, and niacin). The proximate composition of the shrimp immediately after processing was: moisture, 70±1%; protein, 25±0.5%; lipids, 1.0±0.1%; and ash, 1.0±0.025%.

TMA and TVBN values in the heat-radiation test samples of shrimp remained constantly low during the period of storage; the values for the unirradiated controls almost doubled after 3-15 days of storage. Moisture loss of the test shrimp samples was about 0.05% per day. Peroxides could not be detected in the cooked-irradiated test samples of shrimp before and after storage. The FFA of the shrimp increased after the irradiation treatment followed by some decrease during storage. Some changes were observed in the TBA content. Reactions of FFA and TBA-reacting substances with proteins and amino acids may lead to discoloration and

(over)

3.9 (3.60) STABILITY OF INTERMEDIATE MOISTURE FOODS. 1. LIPID OXIDATION

Labuza, T. P., L. McNally, Denise Gallagher, J. Hawkes, and F. Hurtado (Department of Nutrition & Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Food Science 37, No. 1, 154-159 (Jan.-Feb. 1972)

This paper reports on experiments to determine the stability of intermediate moisture food (IMF) systems relative to lipid oxidation. Previous work with model systems on the effect of water and of various liquid humectants showed increased oxidation in the IMF region due to increased catalyst mobility in the larger liquid volume and, also, the higher liquid content caused swelling of the polymetric matrix, thus exposing new catalyst sites. To confirm the results found in model systems, the authors tested actual intermediate moisture foods. The independent effects of water activity and moisture content on lipid oxidation were also examined to determine whether a food is more stable to oxidation if it is on the adsorption branch versus the desorption branch of the isotherms at the same water activity. [According to T. P. Labuza ("Sorption Phenomenon of Foods," Food Technol. 22, 15 (1968)) the sorption isotherm of most foods exhibits a hysteresis loop; thus, depending on the direction of reaching the final water activity, either adsorption by going up the isotherm or desorption by going down from the natural moisture content, IMF systems of similar solids content, the same water activity, but vastly different moisture contents, can be obtained. IMFs are prepared by two

(over)

3.331 (3.336) PHYSICO-CHEMICAL, MICROBIOLOGICAL AND ORGANOLEPTIC INVESTIGATIONS ON STERILIZATION PROCESS OF MACKEREL COLIAS PRODUCT IN ITS OWN LIQUOR

Zięcik, Marian, Mirosław Fik, Olgierd Rzewuski, Anna Fik (Institute for Exploitation of Marine Resources-WSR, ul. Broniewskiego Blok 34, Szczecin, Poland)
Zeszyty Naukowe 35, Rybactwo Morskie II, 121-134 (1971) (In Polish; summary in English) (Science Notes, Marine Fishery II, Higher School of Agriculture of Szczecinie, Szczecin, Poland)

Tests on mackerel Scomber colias canned in its own liquor were performed to to determine optimum processing conditions for acceptable organoleptic properties while minimizing undesireable physicochemical and bacterial changes in the product.

The optimum temperature and time range was found to be 112°-120° C. for 70-45 min. Organoleptic properties were acceptable in the product that was processed for the shortest time at the highest temperature. In addition, acceptable pigmentation was found to depend on the shorter processing period. To prevent unacceptable physicochemical and bacterial changes, filled cans waiting sterilization should be held at room temperature no longer than 1½ hr.

[6 tables, 14 references] Abstract by Jan Walczak modified by SW

3.9 (0.5)(3.60) STABILITY OF INTERMEDIATE MOISTURE FOODS. 2. MICROBIOLOGY

Labuza, T. P., Sally Cassil, and A. J. Sinskey (Department of Nutrition & Food Science, Massachusetts Institute of Technology, Cambridge, MA 02139)
Journal of Food Science 37, No. 1, 160-162 (Jan.-Feb. 1972)

Commercial intermediate moisture food (IMF) systems usually range in water activity (a_w) from 0.7 to 0.85 in order to control the growth of any food poisoning organisms yet allow enough water in the food necessary for the plastic mouth feel of the food. Nevertheless, IMFs at this range of water activity are still susceptible to growth of molds and yeast and must contain an added preservative (potassium sorbate or calcium propionate). In the present study an attempt was made to determine if any differences exists with respect to microbial growth for IMF systems prepared by either the adsorption or desorption methods [see part 1 of this series, J. Food Sci. 37, No. 1, 154-159 (1972)].

A pork and a banana IMF system were prepared at various a_w levels by the adsorption and desorption techniques to give foods of the same solids composition and water activity but different moisture contents. These systems were then inoculated with a mold (Aspergillus niger), a yeast (Candida utilis), a gram-negative bacterium (Pseudomonas fragi), and a pathogenic bacterium (Staphylococcus aureus). All samples were packed in covered jars and the jars were stored at 25° C.

The minimum growth water activity in IMF systems differed significantly with respect to the method of preparation of the foods (adsorption or desorption techniques). The following table summarizes the minimum growth a_w in IMF systems.

(over)

3.330 LOCALIZATION OF THE CRITICAL AREA IN THERMALLY PROCESSED CONDUCTION HEATED CANNED FOODS

Flambert, F., and J. Deltour
Lebensm.-Wiss.+Technol. 5, No. 1, 7-13 (1972) (In English)
BFMIRA Abstracts 25, No. 5, Abstract No. 1791, 364 (May 1972)

It was shown that the critical area (the location of the area of greatest concentration of surviving spores) in a can does not always lie in the geometrical centre of the can. The critical area could lie within a ring-shaped area at the centre plane or at 2 points symmetrical to that plane along the vertical axis. The effect of the cooling phase on the displacement of the critical area was demonstrated. The site of the critical area depended on the height/diameter ratio and was influenced quantitatively only by variations in thermal conductivity or by the "logarithmic slope" of the thermal rise. C.S.B. Reprinted

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3.9 (0.5)(3.60)

IMF system and organism	Minimum growth a_w of the IMF prepared by:	
	Desorption method	Adsorption method
Banana IMF		
Mold	~ 0.68	>0.9
Pork IMF		
Mold	0.75-0.68	>0.9
Yeast	0.84-0.75	>0.9
Pseudomonas	0.84-0.75	>0.9
Staphylococcus	0.84-0.75	>0.9

[5 tables, 14 references] FTP

3.8 PICKLED FISH PRODUCT

Inaba Shokuhin KK (pat.)
Japanese Patent 36178/71
Food Technology 26, No. 4, 170 (Apr. 1972)

Slices of trout are coated with starch then fried in edible oil. The fried slices are canned in a white, emulsified seasoning mixture. FTP

3.12 SHELLFISH PRESERVATION
(3.334)

Walker, E. L., and A. R. Ferrandini (pat.)
Canadian Patent 891,435
Food Technology 26, No. 5, 111 (May 1972)

Cooked shellfish meat, after treatment with a solution of sodium chloride, antibacterial agent, and strong organic acid, is pasteurized. FTP

3.15

off-flavors. Oxidation degradation of astaxanthine (loss of pigment) occurred but could be prevented by vacuum packaging of the product. Irradiation treatment had no effect on the total and free amino acids but did partially destroy some of the water soluble vitamins. There also was some loss of vitamin B_1, B_2, and niacin and of some amino acids during storage of the product at 28°-30° C. for 50 days. The authors state that the nutritional status of the product as a protein food was not affected during storage.
[4 tables, 24 references] FTP

3.9 (3.60)

general processes--the desorption process and the adsorption process. One desorption process involves: "Moist food + dry ingredients + humectant → cook extrude = semisolid food." One adsorption process involves: "Dried food + humectant soak solution → semisolid food."]

At IMF levels, lipid oxidation is accelerated. Antioxidants, butylated hydroxyanisole (BHA) and citric acid, afforded protection against oxidation, but ethylenediaminetetraacetic acid (EDTA) was not effective.

Higher moisture systems oxidize at a much faster rate. Apparently, the method of preparation of IMFs is important in terms of which branch of the sorption hysteresis loop is followed--desorption branch or adsorption branch. Rancidity of IMFs develops much slower at similar solids content and water activity (a_w) if the IM food is at a lower moisture content of the adsorption branch. This phenomenon may be due to the factors of catalyst mobility, viscosity, dissolved solutes, and swelling.

The authors conclude that, with respect to oxidation, intermediate moisture foods prepared by adsorption techniques should have acceptable shelf life.
[5 figures, 9 tables, 20 references] FTP

3.6 DEHYDRATED WHITE FISH

Ishii, R. (pat.)
Japanese Patent 37855/71
Food Technology 26, No. 4, 170 (Apr. 1972)

In this process, the fish are treated with phytic acid. FTP

3.15 USE OF γ-RADIATION DURING THE PREPARATION OF CANNED FOODS
(3.33)

Dutova, E. N., and M. M. Goftarsh (U.S.S.R.)
Chemical Abstracts 76, No. 7, 32933s (Feb. 14, 1972)

3.15 BIOCHEMICAL CHANGES OF FRESH FISH UNDER THE ACTION OF γ-IRRADIATION

Kardashev, A. V., N. D. Bobrovskaya, L. B. Klyashtorin, and N. V. Maslennikova (U.S.S.R.)
Chemical Abstracts 76, No. 7, 32954z (Feb. 14, 1972)

4.6 TERTIARY BUTYLHYDROQUINONE AS ANTIOXIDANT FOR CRUDE SUNFLOWER SEED OIL

Luckadoo, B. M., and E. R. Sherwin (Eastman Chemical Products, Inc., Kingsport, TN 37662)
Journal of the American Oil Chemists' Society 49, No. 2, 95-97 (Feb. 1972)

Crude sunflower seed oil is quite susceptible to oxidation. The present study showed that crude sunflower seed oil could be beneficially and practically protected with the antioxidant butylhydroquinone.
[1 figure, 2 tables, 21 references] FTP

4.6 A CRITICAL REVIEW OF THE SAFETY OF PHENOLIC ANTIOXIDANTS IN FOODS

Johnson, F. C.
Chem. Rubber Co. Critical Rev. Fd Technol. 2, No. 3, 267-304 (1971)
BFMIRA Abstracts 22, No. 2, Abstract No. 508, 107 (Feb. 1972)

The structure, chemical action, metabolism and legal acceptability of a number of common phenolic antioxidants including BHA, BHT and the gallates, are considered in some detail. (114 references) D.M.L. Reprinted

5.1 (3.64)(0.34) OXIDATIVE DECOLORATION OF β-CAROTENE IN LOW-MOISTURE MODEL SYSTEMS

Chou, Hung-En, and William M. Breene (Department of Food Science & Industries, University of Minnesota, St. Paul, MN 55101)
Journal of Food Science 37, No. 1, 66-68 (Jan.-Feb. 1972)

Color and nutritive value are important quality aspects of foods. Carotenoids (a class of lipid-soluble pigments) provide the characteristic color of certain foods (salmon, shrimp) and also serve a nutritional function as provitamin A. The carotenoids are extremely vulnerable to oxidative deterioration in dried foods. The purpose of this study was to examine the oxidative decoloration of β-carotene in simplified low-moisture model systems. The model system technique was used so that the researchers could exert control of the experimental conditions. The model systems consisted of microcrystalline cellulose containing about 0.5% β-carotene. The samples of the model systems in the presence and absence of the antioxidant BHT were exposed to air oxidation at the desired relative humidity. Oxidative decoloration rates of β-carotene were measured by determining changes in color with a reflectance spectrophotometer. β-Carotene is red to yellow, and when the pigment undergoes oxidation, it becomes bleached or discolored. The changes in the spectral reflectance properties of the β-carotene-containing systems were used as indications of the extent of β-carotene discoloration and thus the extent of oxidation.

The decoloration of β-carotene is apparently an autoxidative reaction. The decoloration reaction, after the induction period, followed the first-order rate

(over)

4.92 (4.2) STUDIES ON THE RELATIONSHIP BETWEEN THE NUTRITIVE VALUE AND THE STRUCTURE OF POLYMERIZED OILS. VII. ABSORPTION AND METABOLISM OF THE TOXIC SUBSTANCE SEPARATED FROM THERMALLY OXIDIZED OIL IN RATS

Ohfuji, Takehiko, Kazue Sakurai, and Takashi Kaneda (Department of Food Chemistry, Faculty of Agriculture, Tohoku University, Tsutsumi-dōri, Amemiya-chō, Sendai, Japan)
Journal of the Japan Oil Chemists' Society 21, No. 2, 16-21 (68-73) (Feb. 1972)
(In Japanese; figures, tables, and summary in English)

A toxic dimer (of glycerides) resulting from the thermal oxidation of oil was investigated in rats for digestibility and ultimate distribution in the tissues. Results of the investigation indicated that the toxic dimer: (1) was more digestible than the thermally oxidized oil, (2) was partially hydrolized in digestive organs with accumulations in liver and blood, and (3) inactivated pancreatic lipase. [3 figures, 9 tables, 8 references] SW

6.54 LABORATORY EVALUATION OF THREE PROTEIN SOURCES FOR USE IN CHAPATI FLOURS

Bass, Janet L., and Jean F. Caul (Department of Foods & Nutrition, Kansas State University, Manhattan, KS 66502)
Journal of Food Science 37, No. 1, 100-102 (Jan.-Feb. 1972)

The chapati is a type of unleavened bread prepared from wheat flour and is the principle staple food of West Pakistan. Supplementing the wheat flour with animal or vegetable protein would help improve the nutritive value of the bread. This article reports on the performance (laboratory scale) of nine protein-supplemented wheat flours for use in the preparation of chapati. Assessment of the performance value involved examination of those properties that might affect the acceptability of the product. Because the evaluation of performance values was made by persons not native to the country using chapati, the results indicate only the potential acceptability of the blends of flours. Wheat flours supplemented with fish protein concentrate (FPC), soy protein concentrate (SPC), and cottonseed flour (CSF) were used in the tests. The wheat flour was supplemented by weight with 5%, 10%, and 15% of the test protein concentrates. Flour and dough use properties were observed and the organoleptic properties of the chapati were examined by a flavor profile panel.

The flours supplemented with FPC and with SPC were considered potentially unacceptable to the consumer because of atypical flour, dough, and chapati properties. Undesirable appearance of the chapati supplemented with CSF contraindicated the use of this (CSF) protein supplement.
[3 tables, 7 references] FTP

4.2 (4.92)

STUDIES ON THE RELATIONSHIP BETWEEN THE NUTRITIVE VALUE AND THE STRUCTURE OF POLYMERIZED OILS. VIII. PRESENCE OF TOXIC DIMER GLYCERIDES IN USED FRYING OILS

Ohfuji, Takehiko, Harumi Igarashi, and Takashi Kaneda
Journal of the Japan Oil Chemists' Society 21, No. 2, 21-26 (73-78) (Feb. 1972)
(In Japanese; figures, tables, and summary in English)

A toxic dimer of glycerides was previously found in thermally oxidized oil. A survey was made for its presence in used frying oils. Samples of used oil were collected from food manufacturers which use frying oils. Trace amounts of toxic compound were found in most oils except rapeseed oil used to fry bean curds (1.5%) and soybean oil used to cook fish balls (0.6%). Weight gain of rats fed these oils decreased with the increase of toxic compounds.
[10 figures, 6 tables, 3 references]

SW

6.54

WHAT IS THE FUTURE OF TEXTURED PROTEIN PRODUCTS?

Robinson, Radcliffe F. (Food Ingredients, Marschall Div., Miles Laboratories, Inc., Elkhart, IN 46514)
Food Technology 26, No. 5, 59-60, 62-63 (May 1972)

Textured protein products have a potential market in three areas--industrial, institutional, and "consumer." The industrial use of plant protein granules for extending meat patties, chili, frankfurters, etc. should increase during the next 2 or 3 years. This increase will result from the greater accumulation of knowledge on how to prepare better extended meat products and the acceptance of such products by children in the School Lunch Program.

The institutional market should develop gradually during the next few years. Data are being collected on nutritive value, new recipes for special diets are being prepared, and new formulations for special products are being developed. Such information will promote use of textured protein products in hospitals and in institutions.

The consumer market will have to be developed through a major consumer education program. This educational program will have to emphasize the overall acceptance factors of textured protein products and not their economic advantages. Further, Federal Government cooperation will be required to establish standards of identity for plant protein products and to simplify labeling requirements. FTP

6.32

CHANGES IN MANNITOL AND ALGINIC ACID CONTENTS OF TURBINARIA ORNATA (TURNER) J. AGARDH IN RELATION TO GROWTH AND FRUITING

Rao, M. Umamaheswara, and S. Kalimuthu (Central Marine Fisheries Research Institute, Regional Centre, Mandapam Camp, India)
Botanica Marina 15, No. 1, 57-59 (Mar. 1972) (Walter de Gruyter Inc., 162 Fifth Ave., New York, NY 10010)

Turbinaria ornata grows to a maximum size from October to December. No marked changes were noted in the yield of alginic acid from the alga. The amount of mannitol was high in the early stages of the growth cycle; however, the amount of mannitol decreased when growth of the plant was maximum and the number of fruiting plants in the population was abundant.
[1 figure, 3 references]

FTP

5.1 (3.64)(0.34)

law. Moisture or an antioxidant inhibits the rate of oxidation in a manner similar to that for lipid oxidation. The dry samples had much greater rate constants and shorter induction periods than did the humidified samples. The heat of activation for decoloration was calculated from data obtained at 5°, 20°, and 35° C. and was found to be 9.70 Kcal.
[5 figures, 1 table, 15 references]

FTP

6.10

NEW DEVELOPMENT IN THE WORLD'S FISH MEAL INDUSTRY

Anonymous
Norwegian Fishing and Maritime News 19, No. 1, 10, 13, 21 (1972)

This Norwegian floating fish meal and oil factory is without a propulsion engine but can be towed to the desired port or area of operation. When in operation, the compact factoryship will lie at anchor in port and operate as a self-supporting plant. The floating factory is fully equipped to produce fish meal and oil, and includes unloading, loading, and conveying facilities; diesel electric power station; main steam power plant; fresh-water generators; and storage tanks for raw material, fish meal, fish oil, fuel oil, diesel oil, and fresh water. In addition, the floating factory is equipped with air-conditioned cabins, lounges, and galley, and it has complete service for management and production staff of about 20 persons. It also has a production control laboratory. The special advantage of the floating factory is that it can be towed to areas where fish are abundant. Furthermore, local conditions ashore near areas where fish supplies are abundant are not always favorable for the construction of industrial plants--the floating plant would be useful in such locations. FTP

6.54 (3.9)

EXTRUDED MEAT PRODUCT

Van Wervan, F. M., and F. P. Bohlmeyer; Unilever Ltd. (pat.)
Canadian Patent 891,979
Food Technology 26, No. 5, 111 (May 1972)

Shaped fish (or meat) pastes suitable for canning, freezing, or drying are made. FTP

4.2

STUDIES ON THE RELATIONSHIP BETWEEN THE NUTRITIVE VALUE AND THE STRUCTURE OF POLYMERIZED OILS. IX. PRESENCE OF DIMER OF GLYCERIDES IN COMMERCIAL FATS AND OILS

Ohfuji, Takehiko, Shigeo Chiba, and Takashi Kaneda (Department of Food Chemistry, Faculty of Agriculture, Tohoku University, Tsutsumi-dori, Amamiya-cho, Sendai, Japan)
Journal of the Japan Oil Chemists' Society 21, No. 2, 27-30 (79-82) (Feb. 1972)
(In Japanese; figures, tables, and summary in English)

Tests were performed to determine presence of dimers of glycerides used in cooking fats and oils. No dimers were found. In another experiment a small amount of dimer was found in sesame oil and in margarine containing fats of animal origin. [6 figures, 3 tables, 3 references]

SW

6.54 WHAT ARE TEXTURED PROTEIN PRODUCTS?

Lockmiller, N. R. (Special Products Department, A. E. Staley Manufacturing Co., 2200 East Eldorado Street, Decatur, IL 62525)
Food Technology 26, No. 5, 56, 58 (May 1972)

Textured protein products, primarily those prepared from soybeans, are described. There are two main types of textured protein products, the expanded vegetable proteins and the spun vegetable proteins.

The expanded vegetable proteins are made by cooking and extruding into bite-size particles a mixture of [soy] flour and flavoring and coloring materials.

The spun vegetable proteins are made from vegetable protein isolates; the isolates are treated with alkali and the treated protein is spun into fibers which are then formed into bundles. The bundles are tied together and treated with a binding solution, then with a flavoring and coloring solution.

The Food and Nutrition Service of the U.S. Department of Agriculture has authorized the use of textured vegetable protein fortified with minerals and vitamins in lunches and suppers served under the Child Feeding Program (Type A School Lunch). The USDA specifications for textured protein products for use in the School Lunch Program are shown in the table that follows.

(over)

7.591 (0.38) POSTMORTEM CHANGES IN THE GLYCOGEN PHOSPHORYLASE ACTIVITY OF THE MUSCLE OF WHITE SUCKER (CATOSTOMUS COMMERSONI) AND NORTHERN PIKE (ESOX LUCIUS)

Manohar, S. V., and Helen Boese (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba, Canada)
Journal of the Fisheries Research Board of Canada 28, No. 9, 1325-1326 (Sept. 1971)

Results of earlier work indicated that postmortem degradation of glycogen in northern pike was slower than that in white sucker. Further experiments were performed to find the relation of glycogen phosphorylase to the degradation of glycogen.

Glycogen phosphorylase exists in "a" and "b" forms. The "a" form is enzymatically active and the "b" form is inactive. Phosphorylase "b" becomes active in the presence of adenosine monophosphate (AMP). Measurements of glycogen content and phosphorylase activity were made on muscle of fish killed the same day and on the muscle from the same fish after 7 days' storage on ice.

Since the phosphorylase activity in the muscle of sucker and pike was determined in the presence, and absence, of AMP then the total activity of "a" plus "b" forms will have been measured. After 7 days, activity of phosphorylase without added AMP increased slightly in sucker muscle and decreased significantly in pike muscle. The activity of phosphorylase with added AMP was much higher in muscle of both species than without added AMP. These results indicate that most of the phosphorylase in the muscle was the normally inactive "b" form that had been activated by addition of AMP. Further, a significant amount of glycogen remained in the pike muscle. The authors suggest that incomplete degradation of glycogen in the pike muscle is due to a decreasing amount of phosphorylase "a."
[8 references] SW

7.81 AN INVESTIGATION OF THE METHOD OF DETERMINING TRIMETHYLAMINE IN FISH MUSCLE EXTRACTS BY THE FORMATION OF ITS PICRATE SALT--PART I.

Murray, C. K., and D. M. Gibson (Department of Trade and Industry, Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 7, No. 1, 35-46 (Mar. 1972)

P. L. Hoogland's modification [Circ, Fish. Res. Bd Can. No. 3 (1956)] of W. J. Dyer's picric acid procedure for determining trimethylamine (TMA) in fish muscle extracts [J. Fish. Res. Bd Can. 6, 351 (1945)] was examined as to its usefulness as a routine method and the results are compared to those obtained on the same sample using the microdiffusion method (Conway). In the picrate method, the TMA is volatilized into a toluene phase to which picric acid is added. Then the ionization of the picrate salt is measured photometrically. In the microdiffusion technique, the TMA is volatilized, trapped in acidic buffer, and then measured by titration.

Hoogland's procedure for determining trimethylamine in fish muscle was modified to improve (1) the stability of the fish muscle extract, (2) the accuracy of the results, and (3) the reproducibility of the results when the method is used routinely on a large number of samples. The modifications proposed are: (1) 100 g. of fish muscle are blended with 300 ml. of 5.0% trichloroacetic acid instead of with water; (2) potassium hydroxide (45% is used instead of K_2CO_3 (50%); (3) the spectrophotometer readings are made at 410 nm instead of at 420 nm.

(over)

7.81 AN INVESTIGATION OF THE METHOD OF DETERMINING TRIMETHYLAMINE IN FISH MUSCLE EXTRACTS BY THE FORMATION OF ITS PICRATE SALT--PART II.

Murray, C. K., and D. M. Gibson (Department of Trade and Industry, Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 7, No. 1, 47-51 (Mar. 1972)

In part I of this series, ibid. pp. 35-46, it was found that use of potassium hydroxide is superior to the use of potassium carbonate in the picric acid colorimetric method for the estimation of trimethylamine (TMA) in iced fish. The difference in results obtained when each of the two alkalis are used is small when the method is applied to iced fish. However, when the method is applied to fish that are or have been frozen, use of potassium carbonate as the alkali gives higher values for TMA than does use of potassium hydroxide. Apparently, some volatile basic compound other than TMA is being measured.

In this study, thin-layer chromatography, gas-liquid chromatography, and colorimetric procedures were used to identify and determine the amines present in the standard solutions, extracts of cod muscle, and in the toluene phase of a modified TMA procedure.

The differences in TMA-nitrogen values found for cod muscle using KOH and K_2CO_3 as the alkali in the picric acid procedure was due to the interference by dimethylamine (DMA) in the analysis. The difference is larger in frozen fish

(over)

7.51 WHAT IS SOY PROTEIN?

Wolf, W. J. (Meal Products Investigations, Oilseed Crops Laboratory, Northern Utilization Research and Development Division, U.S. Department of Agriculture, Peoria, IL 61604)
Food Technology 26, No. 5, 44-45, 48, 50, 52-54 (May 1972)

This article contains information on the physical and chemical characteristics of soy proteins. This information is intended to serve as a guide in the use of these proteins in food systems.

Soybeans contain little or no starch, about 20% oil, and about 40% protein. The oil is contained in inclusions called spherosomes (0.2-0.3 μ in diameter); most of the protein is contained in storage sites called aleurone grains or protein bodies (2-20 μ in diameter).

Soybeans are processed into a variety of forms. Full-fat flours consist of ground dehulled soybeans (the term flour refers to particle size). Defatted flakes and flours (prepared by hexane extraction) have a protein content of 50% or more. Soy protein concentrates (prepared by extraction of the soy flakes and flours with solvents such as aqueous alcohol or dilute acid) contain about 70% protein. Soy protein isolates contain about 90% protein.

Soy proteins are a good source of all the essential amino acids except methionine and tryptophan. Its high lysine content makes soy protein a useful complement to certain cereal proteins.

Soy proteins are sensitive to moist heat. Little is known about the physical and chemical changes that take place at the molecular level, but the most obvious change is the loss of solubility. The author discusses in detail the heat-denaturation of soy protein.
[5 figures, 3 tables, 43 references] FTP

6.54

Component of textured protein product and (unit)	USDA Specifications for products used in School Lunch Program	
	Minimum	Maximum
Protein[a] (weight %)	50.0	--
Fat (weight %)	--	30.0
Magnesium (mg./100 g.)	70.0	--
Iron (mg./100 g.)	10.0	--
Thiamin (mg./100 g.)	0.3	--
Riboflavin (mg./100 g.)	0.6	--
Niacin (mg./100 g.)	16.0	--
Vitamin B_6 (mg./100 g.)	1.4	--
Vitamin B_{12} (mcg./100 g.)	5.7	--
Pantothenic acid (mg./100 g.)	2.0	--

[a] (Nitrogen)(6.25)

[1 illustration, 2 tables, 2 references] FTP

6.54 FISH PROTEIN CONCENTRATE

Lee, C. Y.; Fenmwalt Corp. (pat.)
Canadian Patent 891,977
Food Technology 26, No. 5, 111 (May 1972)

n-Butanol is used as a defatting and dehydrating agent in the production of odorless and tasteless fish protein concentrates. FTP

7.81

because greater quantities of DMA can be formed in frozen fish. Thus, DMA might be a useful index of quality in frozen fish. These results apply to cod muscle; further work is needed to determine the extent of DMA interference in the TMA-nitrogen values of other species of fish.
[1 figure, 3 tables, 10 references] FTP

7.89 APPLICATION OF ION-EXCHANGE CHROMATOGRAPHY OF AMINO ACIDS FOR THE QUALITY EVALUATION OF FISH

Tromsdorff, H.
2. Lebensmitteluntersu.-Forsch. 147, No. 3, 133-139 (1971) (In German; English summary)
BFMIRA Abstracts 25, No. 2, Abstract No. 442, 92 (Feb. 1972)

In assessing the suitability of the free amino acid content as a criterion of fish quality it was found that the amounts of only a few amino acids alter sufficiently for this purpose. It was demonstrated that different bacteria influence the decomposition of fish protein in different ways. C.S.B. Reprinted

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7.81

The authors note that, at their research station, the modified picrate procedure has been superceded by the automated method of C. K. Murray and J. R. Burt [Proceedings of the Technicon International Symposium, London, England (1964)].
[2 figures, 9 tables, 11 references] FTP

7.80 HUMAN TASTE PERCEPTION (8.8)

Meiselman, Herbert L. (U.S. Army Natick Laboratories, Natick, Mass.)
Critical Reviews in Food Technology 2, No. 1, 89-119 (1972)

This article is a survey and critical review of recent research on human taste perception. It includes the following subjects.
Taste qualities: Electrophysiological literature with assessment of single papilla stimulation, cross adaptation, taste quality modifiers, stimulus classes, methodological considerations in quality research, techniques of multidimensional scaling (which deal with variables that account for the variability in a system), anesthetics, and use of clinical material;
Basic taste psychophysics: Taste thresholds, and taste scales;
Human taste research procedures: Choice of subjects in human taste research, choice and calibration of stimuli, stimulus delivery, and relevance of human taste research procedures;
Sensory adaptation: Course of gustatory adaptation, and effects of taste adaptation;
Taste mixtures: Mixtures of the same taste, and mixtures of different tastes. SW
[2 figures, 17 tables, 78 references]

7.9 (9.19) THE COLLECTION AND PRESERVATION OF OPEN OCEAN MARINE ORGANISMS FOR POLLUTANT ANALYSIS

Grice, George D., George R. Harvey, Vaughan T. Bowen, and Richard H. Backus (Woods Hole Oceanographic Institution, Woods Hole, MA 02543)
Bulletin of Environmental Contamination and Toxicology 7, No. 2/3, 125-132 (Feb.-Mar. 1972)

The staff at the Woods Hole Oceanographic Institution have undertaken a program to determine the levels of a variety of pollutants in samples from the open Atlantic Ocean. However, collection of authentic uncontaminated samples is difficult because the ocean-going vessel is an abundant source of the same pollutants (petroleum hydrocarbons, pesticides, trace metals) present in open-ocean organisms. Sources of contamination from a ship (including the research vessel) include (1) discharged bilge water, (2) discharge of the septic tank, (3) dumped garbage, debris, or engineroom waste, (4) cleaning discharge of the vessel's boilers and tubes, and (5) discharge of paint chips.

In this article, the authors describe the procedures they have adopted for the collection and preservation of open ocean marine organisms for pollutant analysis.

The following general precautions for collecting samples are suggested: (1) The retrieved samples must be handled carefully, and quickly transferred to the containers in which they will be preserved. (2) The specimens must never come in contact with the ship; the collecting gear should touch the ship as little as possible. (3) The samples and gear should not be washed with the ship's salt water.

(over)

8.8 (6.1) EFFECT OF PROCESSING FEEDS ON MOLDS, SALMONELLA AND OTHER HARMFUL SUBSTANCES IN FEEDS

Crane, Frank M., Mike Hansen, Ralph Yoder, Ken Lepley, and Pat Cox (Land O'Lakes Inc., Ft. Dodge, IA 50501)
Feedstuffs 44, No. 24, 34-36 (June 12, 1972)

Based on this review of the literature on the occurrence of Salmonella microorganisms in feeds and feed ingredients and on some work carried out at the authors' laboratory, it appears that animal protein sources are the significant sources of salmonella organisms. Feed manufacturers reported a high incidence of salmonella contamination of meat meal and of poultry byproducts meal; fish meal and feather meal showed fewer incidences of contamination and contamination of grains was considered negligible. Recent data collected by the U.S. Department of Agriculture are shown in the table that follows.

Feed items	Number of samples examined for Salmonella organisms	Percent of samples found to be contaminated
Animal byproducts	869	31.1
Poultry feed	1,605	5.2
Fish meal	805	4.7
Swine feeds	1,567	3.1
Oilseed meals	2,629	2.3
Cattle feed	2,597	0.9
Grains	2,698	0.7
Total	12,770	--

The opinion was expressed that presence of salmonella in feed ingredients other than animal protein material is due almost entirely to contamination from animal protein sources.

Two steps can be taken to resolve the problem. One step

(over)

7.9 (9.19) COLUMN EXTRACTION OF PESTICIDES FROM FISH, FISH FOOD AND MUD

Hesselberg, R. J., and J. L. Johnson (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Fish-Pesticide Research Laboratory, Columbia, MO 65201)
Bulletin of Environmental Contamination and Toxicology 7, No. 2/3, 115-120 (Feb.-Mar. 1972)

A new column extraction procedure was developed for separating pesticides from fish, fish food, and mud samples. The procedure is efficient, fast, and inexpensive. The extraction, filtration, and drying can be combined in one operation.

Recoveries of organochlorine insecticides from spiked fish and fish food was good, in the range of from 96 to 100%. The recovery precision showed generally less than 3% variation between successive samples. The organophosphorus insecticide parathion was quantitatively recovered from fish samples by use of a mixture of 10% diethyl ether in petroleum ether for the extracting solvent. Recoveries of simazine and 2,4-D (dimethylamine salt) from fish ranged from 95 to 99%. The recovery of simazine-spiked mud gave only an 83% recovery.
[1 figure, 3 tables, 10 references] FTP

9.1 (1.0117) COOPERATIVE GULF OF MEXICO ESTUARINE INVENTORY AND STUDY, LOUISIANA. PHASE II, HYDROLOGY AND PHASE III, SEDIMENTOLOGY

Barrett, Barney B., Johnnie W. Tarver, Walter R. Latapie, Judd F. Pollard, Woodrow R. Mock, Gerald B. Adkins, Wilson J. Gaidry, Charles J. White, and James S. Mathis
Louisiana Wildlife and Fisheries Commission, New Orleans, La. (1971), 191 pp. (Price was not indicated)

Hydrology and Sedimentology of coastal Louisiana are two phases of a four-phase, multi-state project--the Cooperative Gulf of Mexico Estuarine Inventory and Study (GMEI)--undertaken jointly by the Louisiana Wild Life and Fisheries Commission, the Alabama Department of Conservation, the Mississippi Marine Conservation Commission through the Gulf Coast Research Laboratory, and the U.S. Department of Commerce, NOAA, National Marine Fisheries Service, St. Petersburg Biological Laboratory for the west coast of Florida and the Galveston Biological Laboratory for Texas. The other two phases of the undertaking, Area Description and Biology, are covered in detail in a report published by the commission earlier this year.

The primary purpose of this work is to present the hydrological and sedimentological data obtained in coastal Louisiana during the GMEI project.

Louisiana's estuaries from Sabine Lake to the Pearl River were sampled at 109 stations during 1968 and 1969. Salinity and water temperature were measured at all stations; dissolved oxygen, turbidity, and the nutrients nitrate, nitrite, inorganic phosphate, and total phosphorus were sampled at 82 stations. Tide, barometric pressure, rainfall and wind speed and direction were measured at one station.

(over)

7.9 (9 19) SOME SEPARATION CHARACTERISTICS OF AN OV-101/OV-210 COLUMN FOR ORGANOCHLORINATED PESTICIDES WITH PARTICULAR REFERENCE TO THE SEPARATION OF PHOTOENDRIN AND ENDRIN

Chau, A. S. Y., and R. J. Wilkinson (Department of the Environment, Water Quality Division, 45 Spencer Street, Ottawa, Ontario, Canada)
Bulletin of Environmental Contamination and Toxicology 7, No. 2/3, 93-104 (Feb.-Mar. 1972)

Preliminary findings are reported on the use of a mixed OV-silicone column (column was packed with 3.6% OV-101 and 5.5% OV-210 or Chromosorb W, 80-100 mesh, AW, DMCS treated and conditioned for 78 hr. before use) to differentiate photo-endrin and endrin. The column gave sharp peaks to polar compounds such as hydroxyl compounds (dicofol, cis-9 and trans aldrin diols). Furthermore, the column appears to be ideal for separation of oxygen analogs of organophosphates and this aspect is being studied by the present investigations.
[8 figures, 9 references]
FTd

7.9 (9.19) (WATER ACTIVITY) A SIMPLE PRACTICAL METHOD FOR THE MEASUREMENT OF a_w

Rödel, W., and L. Leistner
Fleischwirtschaft 51, No. 12, 1800-1802 (1971) (In German)
BFMIRA Abstracts 25, No. 3, Abstract No. 715, 147 (Mar. 1972)

Equipment is described which measures the water activity which is simple to use and can be used under practical conditions. A correction table for the measurement of water activity between 15° C and 25° C is given. C.S.B.
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(4) The operators' hands, the tools, the sorting trays, and the storage containers should be liberally washed with pharmaceutical grade (95%) ethanol. (The ethanol should be that prepared by ethylene hydration.) (5) The handling and sorting gear must be of metal, of glass, or enameled. (6) The samples must be preserved at temperatures from -10° to -20° C. and must be held in glass or metal containers (glass screwcap jars may be used only if the under-cap liners are made of washed aluminum foil). Special precautions are described for collecting and preserving plankton, large organisms, benthic organisms, and sediment.
[1 table, 2 references]
FTP

9.1 (1.0117)

Coastwide data on air temperature, precipitation, and stages and discharges of the principal rivers were also collected.

In general Louisiana's estuaries and near offshore waters are low in salinity and high in nutrient concentrations as compared with other states bordering the northern Gulf of Mexico. These characteristics are due primarily to Louisiana's high rainfall and the large volume of river water which makes its way through rich alluvial soils to the Gulf of Mexico. The major contributors of nutrients to the estuaries are the Mississippi and Atchafalaya Rivers. These rivers are also responsible for major salt water dilutions within the coastal area and in the near offshore waters. [Extract from authors' Introduction and Abstract]

7.8 (8.8) QUALITY CONTROL AND INSPECTION OF EUROPEAN COMMINUTED [FISH] PRODUCTS

Herborg, L. (Technol. Lab., Minist. Fish., Lyngby, Denmark)
Chemical Abstracts 76, No. 15, 84569x (Apr. 10, 1972)

9.1 (1.01) POPULATION DYNAMICS OF WORLD FISHERIES

Gulland, John A. (Fisheries Department, Food and Agriculture Organization of the United Nations, Rome, Italy)
Washington Sea Grant Program, WSG 72-1, 336 pp. (May 1972) Available from the University of Washington Press, 1415 N.E. 41st St., Seattle, WA 98195, U.S.A. Price $7.50, paperback.

This book is a collection of lectures delivered by the author at the University of Washington during the fall of 1971. The series describe the major world fisheries and the changes that have taken place as a result of fishing operations. The application of fish population dynamics to the rational management of the fisheries resources is also described.
FTd

8.8 (6.1)

would be to eliminate animal protein materials from the feeds. Although this would be feasible from the nutritional standpoint, it would not be economical or practical. The other step would be to pellet or granulate all livestock feeds. Data presented in this report indicate that salmonella are destroyed in the process of pelleting feeds.

Actually, the authors believe that the best solution would be to produce salmonella-free animal protein products and to maintain them in this condition. Such materials can be produced; a recommended plant practices program has been developed by the cooperative efforts of the Federal Food and Drug Administration, the National Renderers Assoc., and the American Feed Manufacturers Assoc. One of the pertinent references cited was "Control of Salmonella in Fish Meal," by B. J. Carroll and B. Q. Ward, FIR Reprint, Fishery Industrial Research 4, No. 1, 29-36 (1967), a publication of the Bureau of Commercial Fisheries.
[12 tables, 4 references]
FTd

7.89 CONTRACTIBILITY OF MUSCLE FIBRES AS A POSSIBLE AID TO JUDGING TEXTURAL CHANGES IN FROZEN MEATS AND FISH

Partmann, W.
J. Texture Studies 2, No. 3, 328-338 (1971)
BFMIRA Abstracts 25, No. 2, Abstract No. 504, 106 (Feb. 1972)

The changes in the contractibility of muscle fibres in suspension during frozen storage were measured by turbidity measurements. There were no significant changes in contractibility of beef muscle stored at -8° C but considerable loss occurred in white chicken muscle and in cod and carp muscle. It is proposed that this method could be used for evaluating textural changes in fish. C.S.B.
Reprinted

9.1 GENETICS AND FISH FARMING

Purdom, Colin E. (Fisheries Laboratory, Lowestoft, Suffolk, England)
Ministry of Agriculture, Fisheries and Food, Laboratory Leaflet (New Series) No. 25, 17 pp. (Mar. 1972)

Genetic techniques in use in agriculture are applicable to fish culture, but their use should be based on genetic and economic grounds and not on a rule-of-thumb approach. In selection work especially, clear objectives and some knowledge of the genetic basis of variation are essential. Hybridization is a useful tool in fish farming and should be used rationally to combine desirable features of two or more species. Hybrid vigor may be an attribute in species or generic crosses, but it is not a general phenomenon of hybridization in fish, and its biological basis is not understood. New ways of manipulating chromosomes are being developed. Gynogenisis (A form of parthenogenesis reproduction without fertilization) promises to be a rapid way of producing inbred lines, and similar techniques can be used to create artificial polyploids (fish with more than two sets of chromosomes). Triploids can be useful because growth rates tend to be greater than equivalent diploids (normal individuals with two sets of chromosomes) and because they are usually sterile, energy is used for growth rather than in sexual maturation. Tetraploids have not yet been produced, but if appropriate methods can be devised they could provide powerful tools for the manipulation of genetic material. [8 figures, 2 tables, 1 plate] SW

9.11 (9.19) ENRICHMENT OF HEAVY METALS AND ORGANIC COMPOUNDS IN THE SURFACE MICROLAYER OF NARRAGANSETT BAY, RHODE ISLAND

Duce, Robert A., James G. Quinn (Graduate School of Oceanography, University of Rhode Island, Kingston, RH 02881), Charles E. Olney, Stephen R. Piotrowicz, Barbara J. Ray, and Terry L. Wade
Science 176, No. 4031, 161-163 (Apr. 14, 1972)

Earlier work [W. D. Garrett, Deep-Sea Res. 14, 221 (1967) and P. M. Williams, ibid p. 791] demonstrated the presence of a variety of surface-active materials (e.g., fatty acids and fatty alcohols) at the surface microlayer of the ocean. The major source of these surface-active compounds in the open ocean is the reservoir of natural marine organic matter in the mixed layer. Many pollutants, especially lipophilic pollutants such as chlorinated hydrocarbons and petroleum hydrocarbons, may be concentrated and stabilized in this layer after its formation. Also, trace metals may be concentrated in the microlayer. Organic substances (acids, proteinaceous materials, and other surface-active substances) may furnish complexing sites for heavy metals and thereby be responsible for the transportation and concentration of these heavy metals at the surface of the water.

This article describes the authors' work on the distribution of fatty acids, hydrocarbons, chlorinated hydrocarbons, and trace metals (Pb, Fe, Cu, Ni) in the surface microlayer (top 100 to 150 micrometers) and the subsurface water (20 centimeters below the surface) samples from Narragansett Bay, R.I.

The levels of lead, iron, copper, and nickel in the surface microlayer samples of the water were 1.5 to 50 times the levels in the subsurface samples. This enrichment of trace metals appeared in the particulate and organic fractions of the

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9.12 GROWTH PER MOULT OF TAGGED LOBSTERS (HOMARUS AMERICANUS) IN BONAVISTA BAY, NEWFOUNDLAND

Ennis, G. P. (Biological Station, Fisheries Research Board of Canada, St. John's, Newfoundland, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 2, 143-148 (Feb. 1972)

Most of the information already collected on the growth of the American lobster was obtained with the use of a marking technique in which holes are punched or bored in various parts of the tail fan of the lobster. In this study two tagging techniques were used to obtain growth data on lobsters in nature: the first involved the ferromagnetic tag [K. B. Jefferts, P. K. Bergamn, and H. F. Fiscus, Nature 198, 460-462 (1963)] and the second, the sphyrion tag [D. J. Scarratt, J. Fish. Res. Bd Canada 27, 257-264 (1970)]. Lobster growth data obtained by use of the two tags were compared, and data on the use of the sphyrion tag was presented in some detail.

Comparison of growth data of lobsters in nature obtained from ferromagnetic tags and from sphyrion tags during the years 1967 to 1969 showed no difference in growth with one exception, for female sphyrion-tagged lobsters there was a slight difference ($P = 0.042$) between 1968 and 1969. Data are given on carapace length and total weight increments on molting and on incidence of molting of lobsters tagged with sphyrion tags.
[3 figures, 3 tables, 19 references] FTP

9.15 (0.5) INFECTIOUS PANCREATIC NECROSIS OF SALMONIDS IN ONTARIO

Sonstegard, R. A., and L. A. McDermott (Department of Microbiology, University of Guelph, Guelph, Ontario, Canada)
Journal of the Fisheries Research Board of Canada 28, No. 9, 1350-1354 (Sept. 1971)

Organs and feces of 2,400 fish in six hatcheries were examined for infectious pancreatic necrosis (IPN). The fish included 1,400 brook trout (Salvelinus fontinalis), 707 lake trout (S. namaycush), 84 splake (S. fontinalis x S. namaycush), and 250 rainbow trout (Salmo gairdneri). Their ages ranged up to 12 years. Examinations conducted between November 1968 and February 1969 at five hatcheries detected no IPN. In March 1969, IPN virus was detected in brook trout yearlings at a sixth hatchery. In April 1969, examination of random samples of brook trout, which were parent fish of the yearlings, detected IPN virus. (The parent brook trout were located at one of the five hatcheries where no IPN virus was detected between November 1968 and February 1969.) At the same hatchery, in December 1970, IPN virus was detected in all brook trout brood stock.

No history of abnormal mortalities was reported from hatcheries where IPN virus had been detected. The virus had little effect on brook trout in these hatcheries but caused 40% mortality when inoculated into brook trout from another source. [1 table, 5 references] SW

9.11 (9.19)

surface microlayer, but did not appear in the inorganic fraction. The authors estimate that if these substances are concentrated in films only a few molecular layers thick on the surface of the water, the actual enrichment factor in the films may be well over 10^4, thus resulting in extremely high localized pollutant concentrations in the surface microlayer.
[1 table, 8 references] FTP

9.15 CADMIUM POISONING IN FUNDULUS HETEROCLITUS (PISCES: CYPRINODONTIDAE) AND OTHER MARINE ORGANISMS

Eisler, Ronald (U.S. Environmental Protection Agency, National Marine Water Quality Laboratory, West Kingston, RH 02892)
Journal of the Fisheries Research Board of Canada 28, No. 9, 1225-1234 (Sept. 1971)

Available evidence indicates that: (1) cadmium is not biologically essential, (2) cadmium is toxic to humans, (3) a major source of cadmium in the human diet is seafood, and (4) cadmium is found in wastes from industrial and other sources discharged into estuarine environments. For these reasons the effects of cadmium on marine organisms was investigated.

Species of annelids, crustaceans, echinoderms, molluscs, and a teleost (mummichog) were subjected to various levels of $CdCl_2 \cdot 2\frac{1}{2} H_2O$ to determine toxicity of Cd^{2+} at 20° C., and 20 ‰ salinity in 96 hr. Concentrations fatal to 50% of the organisms ranged between 0.32 and 55.0 mg/liter Cd^{2+}. The most sensitive was sand shrimp (Crangon septemspinosa) (0.32) and the most resistant was mummichog (Fundulus heteroclitus) (55.0). Mummichogs were more susceptible to cadmium at 20° C. and 5 ‰ salinity than at 5° C. and salinities of 15, 25, or 35 ‰. Additional studies with mummichog indicated that 96 hr. was not sufficient to evaluate toxicity of cadmium for this species. Mummichog whole body cadmium residues determined by atomic absorption, provided a useful index of cadmium body burden among surviving fish. Dead mummichogs accumulated more cadmium than living animals: cadmium data from this source should be interpreted with extreme caution. Levels as low as 0.1 mg Cd^{2+} per liter of medium are potentially harmful to mummichogs and probably other marine species.
[3 figures, 5 tables, 28 references] SW

9.10 INITIAL STUDIES ON A METHOD OF ALGAL ASSAY FOR NUTRIENT PARAMETERS IN WATER (9.19)

Cullimore, D. R., and A. McCann (Department of Biology, University of Saskatchewan, Regina Campus, Regina, Saskatchewan, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 2, 195-198 (Feb. 1972)

This paper describes a bioassay technique for estimating the impact of supplementation of the nutrients carbon, nitrogen, and phosphorus on algal growth. The monitoring of algal growth was achieved by a system involving filtration and re-electrometric readings at 600 nm.
[1 figure, 1 table, 5 references] FTP

9.13 FREEZING RESISTANCE IN POLAR FISHES

Hargens, Alan R. (Physiological Research Laboratory, Scripps Institution of Oceanography, University of California, San Diego, La Jolla, CA 92037)
Science 176, No. 4031, 184-186 (Apr. 14, 1972)

The purpose of this study was to compare the freezing resistance in arctic and antarctic fishes to help in the understanding of the freeze-resistance properties of their blood. Six species of fish were used in the tests. Eleginus gracilis (living in -1.8° C. ice-covered sea water) and Myoxocephalus scorpioides (living in -1.4° C. ice-covered sea water) were obtained at a depth of 2 m. near Nunivak Island, Alaska. Notothenia coriceps and N. gibberifrons (living in sea water at 2° C.) were caught near shore at Anvers Island, Antarctica. Chaenocephalus aceratus and Pseudochaenichthys georgianus, hemoglobin-free icefishes (living in 2°C. sea water) were caught in deeper waters off Anvers Island. Plasma equilibrium melting points, equilibrium freezing points, temperature of initial ice propagation, colloid osmotic pressure, protein concentration, and rates of ice formation, were determined.

The author found that arctic and antarctic fishes, living in contact with sea ice at -1.9° C., have plasma equilibrium freezing points near -1.2° C. which are dependent on salt concentrations. Equilibrium freezing measurements (various earlier publications) have demonstrated that arctic and antarctic fishes living in contact with sea ice are supercooled. The supercooled fishes in the present test had plasma protein concentrations much higher than other polar animals have, and the proteins impede ice propagation at temperatures down to -2° C. Also, plasma protein concentration increases as the temperature of the environmental water decreases. Earlier workers have suggested that hydroxyl-rich compounds inhibit growing surfaces of ice crystals in the serums of supercooled fishes.
[2 figures, 1 table, 13 references] FTP

9.12 DIFFERENCES IN ATLANTIC SALMON, SALMO SALAR, FROM NORTH AMERICA AND EUROPE

Nyman, O. L., and J. H. C. Pippy (Biological Board of Canada, St. John's, Newfoundland, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 2, 179-185 (Feb. 1972)

North American and European Atlantic salmon caught at sea were identified by differences in the electropherograms produced by their serum proteins and liver esterases. The results obtained support the suggestion that salmon from North America and from Europe represent different subspecies.
[8 figures, 3 tables, 28 references] FTP

9.12 BIOLOGY OF ROCK CRAB (CANCER IRRORATUS) IN NORTHUMBERLAND STRAIT (1.86)

Scarratt, D. J., and Robert Lowe (Biological Station, Fisheries Research Board of Canada, St. Andrews, New Brunswick, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 2, 161-166 (Feb. 1972)

This paper reports some observations on the biology, population structure, and ecological relation with lobsters of the rock crab in Kouchibouguac Bay, N.B., Canada. Information is given on numbers, size distribution, and sex ratio; growth; maturity and breeding; larval abundance and distribution; stomach contents; ecological relationship with the lobster; and possible effects of a crab fishery.
[3 figures, 3 tables, 12 references] FTP

9.15 FISH VIRUSES: HISTOPATHOLOGIC CHANGES ASSOCIATED WITH EXPERIMENTAL CHANNEL CATFISH VIRUS DISEASE

Wolf, Ken, and Roger L. Herman (Bureau of Sport Fisheries and Wildlife, Eastern Fish Disease Laboratory, Kearneysville, WV 25430), and C. P. Carlson (Bureau of Sport Fisheries and Wildlife, Fish Farming Experimental Station, Stuttgart, AR 72160, U.S.A.)
Journal of the Fisheries Research Board of Canada 29, No. 2, 149-150 (Feb. 1972)

Channel catfish virus disease (CCVD) is an acute hemorrhagic infection; it occurs during summer and causes high mortality among the young catfish. This article reports on the histopathologic effects of CCVD. Channel catfish fry were experimentally infected with the disease. The infection produced a hemorrhagic and necrotic disease. The target organs of the disease were the kidneys, liver, digestive tract, and skeletal muscle.
[2 figures, 5 references] FTP

9.15 DISTRIBUTION, EXCRETION, AND METABOLISM OF [^{14}C]-DDT IN THE LARVA AND ADULT TROCODERMA GRANARIUM IN RELATION TO TOXICITY

Gupta, Balraj, Hari C. Agarwal, and M. K. K. Pillai (Dep. Zool., Univ. Delhi, Delhi, India)
Chemical Abstracts 76, No. 11, 55219e (Mar. 13, 1972)

9.16 (2.08) A COMPARISON OF THE FLAVOURS OF FARMED AND TRAWLED PLAICE

Hume, A., J. W. Farmer, and J. R. Burt (Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 7, No. 1, 27-33 (Mar. 1972)

The flavor of a fish may vary depending on the nature of the feed and on other environmental conditions. The purpose of this study was to determine if the artificial conditions existing at a fish cultivation establishment in Scotland affected the flavor and thus the consumer acceptability of plaice. The particular fish cultivation unit is concerned with the husbandry and fattening of young plaice to marketable size. In these experiments, those factors likely to affect the flavor of the farmed plaice were examined. These included: (1) the possible difference between farmed fish and wild fish, (2) the effect of exercise of the farmed fish immediately before slaughter (Farmed fish are normally in a rested condition.), (3) the effect of starvation of the farmed fish for 3 weeks immediately before slaughter, (4) the effect of storage of the gutted versus the ungutted fish in ice, and (5) the effect of storage, up to 7 days, of the the gutted and ungutted fish. The (wild) plaice were caught by a research trawling vessel. The test fish samples were examined by taste panels employing the triangular testing scheme.

The results indicate that flavor differences do exist between farmed plaice and wild plaice, but the taste panels were unable to pick out the differences reliably. The farmed plaice appeared to have a distinctive and unnatural tang when tasted--a trained taste panel described this tang as "sour," "acid," or "earthy." Preslaughter treatments (exercise, starvation) had no effect on the flavor of the
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9.19 METHYLMERCURY IN FRESHWATER AND MARINE FISHES IN NEW BRUNSWICK, IN THE BAY OF FUNDY, AND ON THE NOVA SCOTIA BANKS

Zitko, V., B. J. Finlayson, D. J. Wildish, J. M. Anderson, and A. C. Kohler (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick, Canada)
Journal of the Fisheries Research Board of Canada 28, No. 9, 1285-1291 (Sept. 1971)

Tests for methylmercury were performed on samples of fresh-water fish taken from 16 stations, marine fish taken from 30 stations, and samples taken from museum specimens. Gas chromatography was used to identify mercury-containing compounds in the samples. Fresh-water fish contained the following levels of methylmercury (expressed as p.p.m. of mercury on the wet basis): American eel (Anguilla rostrata) 0.07-2.08; chain pickerel (Esox niger) 0.27-1.58; white perch (Morone americana) 0.75-1.07; yellow perch (Perca flavescens) 0.20-1.05; brook trout (Salvelinus fontinalis) 0.08-0.13; and Atlantic salmon nonfresh-water phase (Salmo salar) 0.09.

Marine species with two exceptions contained levels of methylmercury ranging from 0.01 to 0.11 p.p.m. Swordfish protein concentrate contained 6.32 p.p.m. A source of mercury in the ecosystems is from industrial effluent discharged into lakes or marine locations. Other sources are natural such as airborne mercury deposited in precipitation. The data of freshly caught specimens was compared with that of museum specimens. Based on this comparison the authors conclude that methylmercury concentration in eels taken from a lake in New Brunswick has not changed in 46 years. [2 figures, 4 tables, 27 references] SW

9.19 (1.0145) POLLUTED RIVERS

Anonymous
Nature 237, No. 5350, 65 (May 12, 1972)

Recent industrial expansion in the Ural area of the U.S.S.R. has resulted in a major pollution problem in the Volga and Ural Rivers. Because of the problem, the U.S.S.R. Government issued a resolution concerning antipollution measures for the river systems. Under the plans of the resolution, 421 major manufacturing enterprises are to be equipped with purification plants by 1975 at a cost of 700 million rubles. Also, 300 million rubles will be allotted to sewage and purification plants in 15 towns on the Volga River and its tributary, the Kana River. It is projected that by 1980, discharge of unpurified wastes and sewage into these rivers will be totally stopped. As an intermediate pollution control measure, the Ministries of Fisheries and of Navigation are to equip ships using the Volga and Ural Rivers with devices and systems for collecting waters polluted by urban wastes and bilges. Devices for collecting petroleum wastes and other liquid and solid pollutants are to be installed in the river ports and shipping basins. The Ministry of Irrigation and Water Economy and certain industrial ministries will carry out projects not only to cut down pollution but to conserve the supply of water in the rivers. Plans are being implemented to divert waters of the north-flowing Siberian rivers to feed the Volga River and its tributaries. FTP

9.16 (2.08)

farmed plaice. In one test of the farmed fish stored in ice, it was found that gutted fish tasted differently from ungutted fish. The authors recommended, therefore, that farmed plaice be gutted at harvesting rather than at a later stage in the marketing process. The authors indicate that the overall results apply to the particular stocks of fish that were examined.
[2 tables, 16 references] FTP

9.16 PRELIMINARY STUDY OF SABLEFISH CULTURE, A POTENTIAL NEW INDUSTRY

Kennedy, W. A. (Biological Station, Fisheries Research Board of Canada, Nanaimo, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 2, 207-210 (Feb. 1972)

The author found that sablefish Anoplopoma fimbria were easy to farm. Second-year juvenile sablefish, weighing about 300 g., were captured then reared in fiberglass tanks to about 4 kg. in weight. Under growth-favoring conditions, the sablefish gained about 150 g. per fish per month; they used about 5 kg. (wet weight) of feed per kilogram of weight gained; and they showed mortalities of less than 1% per month. In crowding experiments, it was found that concentrations of at least 43 kg. of fish/m^2 (or 70 g./liter) did not adversely affect growth or mortality of the sablefish. The author suggests that possibly a new industry could be based on capture of second-year juvenile sablefish and rearing them to a marketable size.
[1 figure, 1 table, 8 references] FTP

9.19 INTERNATIONAL CONGRESS ON INDUSTRIAL WASTE WATER

Göransson, B. [Symposium editor]
[Various authors and subjects listed below]
Pure and Applied Chemistry 29, Nos. 1-3, 1-492 (1972)

This issue of the journal contains the plenary and main technical lectures presented at the International Congress on Industrial Waste Water held in Stockholm, Sweden, on 2-6 November 1970. Pertinent articles of interest to the fisheries are as follows:

"Wirtschaftliche Aspekte beim Kampf der Industrie gegen die Gewässer-verschmutzung" [Economics of water pollution abatement in industry] by W. Gässler (Bundesverband der Deutchen Industrie E.V., Postschliessfach 5 Köln 51,West Germany), pp. 1-9 (In German)

"Waste Water Investigation in Plants," by L. Bruneau (Swedish Pollution Control Company, Drottning Kristinas Väg 47D, S-11428, Stockholm, Sweden), pp. 11-18. [4 figures]

"Methods and Techniques of Continuous Measurement of Water Quality in Rivers, Effluents and Purification Plants," by W. Husmann (Ahornzweig 1, 43 Essen-Stadtwald, West Germany), pp. 19-46. [20 figures, 2 references]

"Measures Taken Against Water Pollution in the Food Processing Industry," by L. C. Gilde (Campbell Soup Co., Campbell Place, Camden, NJ 08066), pp. 143-162. [13 figures, 4 tables, 9 references]

"Waste Disposal in the Meat Industry (A Comprehensive Review of Practice in the United States)," by A. J. Steffen (Purdue University, School of Engineering, Lafayette, IN 47907), pp. 173-190. [6 figures, 2 tables, 29 references]

The other 25 articles deal with water pollution control in the petroleum, chemical, food, iron and steel, pulp and paper, coal mining, tanning, and fermentation industries. FTP

9.19 ESTIMATE OF THE WORLD BUDGET OF FALLOUT SILVER NUCLIDES

Hodge, V. F., and T. R. Folsom (Scripps Institution of Oceanography, La Jolla, CA 92037)
Nature 237, No. 5350, 98-99 (May 12, 1972)

Silver iodide is used in cloud-seeding experiments. Information on the ecological fate of fallout silver is needed because of interest in the behavior of silver in the marine environment. Recently, R. Grismore, T. R. Folsom, V. F. Hodge, and D. R. Young [Trans. New York Acad. Sci. (in press)] estimated the minimum budget of ^{110m}Ag over the surface layers of the northern hemisphere created during nuclear weapons testing during 1961-62. They made the estimate on the basis of the concentration of ^{110m}Ag in the livers of nine tune fish caught in the North Pacific in 1965 and by the use of various assumptions. These assumptions were: a concentration factor for silver in the tuna fish livers over sea water of 500,000; a volume of the top 100 m. of the North Pacific of 7.1×10^{18} l.; and the total area of the northern hemisphere of 2.55×10^8 km^2. The computed estimated budget of ^{110m}Ag over the surface layers of the northern hemisphere in 1962 was at least 100,000 Ci.

In this article, an entirely independent approximation of the ^{110m}Ag budget was made from the ratios of reported concentrations of fallout ^{90}Sr and ^{110m}Ag in 60 air filters [H. W. Feely, J. P. Friend, R. J. Lagomarsino, D. C. Bogen, P. E. Biscaye, and J. E. Hardaway, U.S. Atomic Energy Comm. Health and Safety Lab. Rep., HASL-168, 197 (1966)] collected at high altitudes over the northern hemisphere during July to December 1965. This estimate was 100,000 Ci. Further work is continuing at the Scripps Institution of Oceanography to determine the world budget of the long-lived (127 yr.) ^{108m}Ag.
[1 figure, 1 table, 7 references] FTP

9.19 THE EFFECT OF PHENYLMERCURIC ACETATE UPON THE FREQUENCY OF HATCHING OF EGGS FROM THE ZEBRAFISH

Kihlstrom, J. E., and L. Hulth (Institute of Zoophysiology, Uppsala, Sweden)
Bulletin of Environmental Contamination and Toxicology 7, No. 2/3, 111-114 (Feb.-Mar. 1972)

Does the presence of mercury compounds in natural waters affect the reproduction of aquatic animals? To help answer this question, a study was made of the effect of phenylmercuric acetate upon the frequency of hatching and the time required for development of eggs of zebrafishes. About 400 sexually mature zebrafishes were distributed among 13 experimental groups. Each group was kept in 30-liter polyethylene containers under laboratory conditions. The zebrafish eggs were collected daily and treated in accordance with the experimental conditions. The treated eggs were exposed to aerated water containing 10, 20, or 50 ng of phenylmercuric acetate per g. (these concentrations correspond to 3.0×10^{-8}, 6.0×10^{-8}, and 1.5×10^{-7} M-solutions, respectively). The eggs were kept at 27°±0.5° C.

The frequency of hatching of the eggs was significantly higher in water containing 10 ng phenylmercuric acetate per g. than in the controls (containing no added phenylmercuric acetate). The frequency of hatching of the eggs exposed to 20 ng of phenylmercuric acetate per g. of water was the same as that of the controls. None of the zebrafish eggs survived exposure to water containing 50 ng of phenylmercuric acetate per g. The increased hatchability of the eggs exposed to water containing 10 ng of the phenylmercuric acetate per g. may have been due to the bactericidal and fungicidal activity of the chemical on the aquatic microorganisms. However, the authors suspect that low concentrations of mercuric compounds in the water may increase the hatchability of the zebrafish eggs in other ways as well. [2 tables, 18 references] FTP

[1 figure, 1 table, 7 references]

9.19 (9.17) PRINCIPLES OF WATER LEGISLATION AND SOME TASKS OF FISHERIES SCIENCE

Isayev, A. I. (Ichthyological Commission U.S.S.R. Ministry of Fisheries, Moscow, U.S.S.R.)
Journal of Ichthyology 2, No. 3, 295-301 (1972)

Laws prohibiting pollution of fresh-water bodies from industrial and agricultural sources are required. Enforcement of the laws is necessary to return fresh-water resources to acceptable conditions.

Legislation is also necessary to conserve fresh-water fishery resources. For example, the existence of intakes for power generators or irrigation networks on a body of water used by a fishery industry is a problem of compatibility. It can be solved by implementation of standard practices based on laws that would require installation of screens over the intakes to protect the fish. Otherwise, young fish are killed in turbines or pumping stations, or die in the irrigation ditches in the fields.

Legislation is also required to provide standards for construction of dams and irrigation systems relating to existing or potential fisheries. In addition, regulations are required to provide for controlled water discharge from dams and acceptable logging practices near streams flowing into spawning areas or estuaries.

The U.S.S.R. has many large lakes and rivers with valuable fishing industries established on them. Pollution of these waters from industrial and agricultural activities is endangering the fish stocks. The Government has recognized the problem of pollution and is currently engaged in building treatment plants to

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9.19 CHANGES IN ORGANOCHLORINE CONTAMINATION OF THE MARINE ENVIRONMENT OF EASTERN BRITAIN MONITORED BY SHAG EGGS

Coulson, J. C., I. R. Deans, G. R. Potts (Department of Zoology, University of Durham, England), J. Robinson, and A. N. Crabtree (Shell Research Ltd., Sittingbourne, Kent, England)
Nature 236, No. 5348, 456-457 (Apr. 28, 1972)

The authors found significant declines of the concentrations of organochlorine insecticides in the eggs of shag (Phalacrocorax aristotelis) in recent years. This observation is noteworthy inasmuch as the shag is a member of the fourth trophic level and the decline of the concentration of pp'-DDE is inconsistent with the model prepared by H. L. Harrison, O. L. Loucks, J. W. Mitchell, D. F. Parkhurst, C. R. Tracy, D. G. Watts, and V. J. Yannacone, Jr. [Science 170, 503 (1970)] that predicts no decrease of DDT concentration in animals at the top of the trophic structure even if no further quantities of the substance are added to the biosphere.
[2 figures, 1 table, 12 references] FTP

9.19 MICROBIOLOGICAL DECOMPOSITION OF OIL, ESPECIALLY PETROLEUM

Azarowicz, Edward N. (Bioteknika International, Inc.) (pat.)
German Offen. (Patent) 2,127,577 (Dec. 9, 1971)
Chemical Abstracts 76, No. 20, 117309t (May 15, 1972)

9.19 SOME ASPECTS OF THE CHEMISTRY AND ACUTE TOXICITY OF THE IRON ORE FLOTATION AGENT DIMETHYL AMMONIUM ALKYL HYDROXAMATE AND SOME RELATED COMPOUNDS TO BROOK TROUT

Fletcher, G. L., and R. F. Addison (Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute, Dartmouth, Nova Scotia, Canada)
Bulletin of Environmental Contamination and Toxicology 7, No. 2/3, 147-159 (Feb.-Mar. 1972)

In the mining industries, flotation agents are used to separate ores from the unwanted materials (such as silica). Compounds that can serve as flotation agents include straight chain fatty acid salts, alkyl aryl sulfonates, and fatty amines. The U.S.S.R. literature reports the use of alkyl hydroxamic salts for flotation agents and a Canadian firm is currently evaluating the use of a hydroxamate mixture for iron ore flotation. The preparation used by the Canadian group is a mixture of hydroxamic acids prepared from a distillation cut of coconut oil methyl esters, partially neutralized with dimethylamine, and suspended in technical grade isopropanol to a concentration of 75%. Should this preparation be used commercially for the purpose, it is likely that some would eventually appear in local rivers and lakes. The researchers, therefore, carried out this study to assess the toxicity of dimethyl ammonium alkyl hydroxamate and some related compounds to brook trout. Because dimethyl ammonium alkyl hydroxamate consists of a number of molecular species in equilibrium, the toxicity assays were carried out with several of them to determine their contribution to any toxicity that may be found.

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9.2 (9.3)(9.17) AN ECONOMIC APPROACH TO LAND AND WATER RESOURCE MANAGEMENT: A REPORT ON THE PUGET SOUND STUDY

Bish, Robert L. (Department of Economics and Graduate School of Public Affairs, University of Washington, Seattle, WA 98195)
The original paper appeared in Economics of Natural Resource Development in the West: Interdisciplinary Research in Natural Resources and Issues of Land Use Planning, Report No. 2, Committee on the Economics of Natural Resources Development of the Western Agricultural Economics Research Council, 1971, pp. 75-99. Revised April 18, 1972.
Institute for Economic Research, University of Washington, Department of Economics, Seattle, WA 98195, 18 pp. (April 1972)

The Puget Sound, Wash., area is an important natural resource and demands have increased for the variety of uses for which it is suited. These demands have created conflicts over use of the area and, furthermore, there is some concern that some uses may destroy the Puget Sound's potential for other more valuable uses. The purpose of this study was to develop an understanding of the process by which Puget Sound's land and water uses are determined so that those processes can be continually improved.
[8 references, appendix] FTP

9.19

Dimethyl ammonium alkyl hydroxamate was lethal to brook trout at levels as low as 4.5 mg./l. Dimethylamine was nontoxic; hydroxylamine was as lethal as dimethyl ammonium alkyl hydroxamate (on a molar basis); and NaC_{10} hydroxamate was from 5 to 10 times more toxic than hydroxylamine or dimethyl ammonium alkyl hydroxamate. The hydroxamate agent appears to be the major lethal component.
[2 figures, 4 tables, 15 references] FTP

9.19 (9.17)

intercept effluents that are causing pollution; also, public agencies have been empowered to provide standards for the construction of the treatment plants, and to regulate activities that are sources of pollution. SW

9.19 METABOLISM OF POLYCHLORINATED NORBORNENES BY CLOSTRIDIUM BUTYRICUM

Schuphan, Ingolf, and Karlheinz Ballschmiter (Institut für Anorganische Chemie und Kernchemie der Universität D6500 Mainz, Germany)
Nature 237, No. 5350, 100-101 (May 12, 1972)

In studies of the metabolism of cyclodien-insecticides (such as dieldrin, endrin, endosulfan), it was revealed that with all metabolites identified so far the hexachlorinated norbornene moiety remained unchanged. In this article, the authors report the conversion of the hexachloro-norbornene moiety by the microorganism C. butyricum.
[2 figures, 1 table, 12 references] FTP

9.19 ABSENCE OF CHLORINATED DIBENZODIOXINS AND DIBENZOFURANS FROM AQUATIC ANIMALS

Zitko, V. (Environment Canada, Fisheries Research Board of Canada, Biological Station, St. Andrew's, New Brunswick, Canada)
Bulletin of Environmental Contamination and Toxicology 7, No. 2/3, 105-110 (Feb.-Mar. 1972)

Chlorinated dibenzodioxins are impurities of chlorinated phenols and of herbicides based on chlorinated phenols. Commercial preparations of polychlorinated biphenyls are potential sources of chlorinated dibenzofurans. Residues of chlorinated dibenzodioxins and dibenzofurans were not detectable in the muscle and liver of white shark, in the eggs of double-crested cormorants and herring gulls, in the muscle of eel and chain pickerel, and in commercial samples of herring oil and groundfish-herring fishmeal. The chemicals examined and their detection limits on the tissue weight basis are: 2,3,7,8-tetrachlorodibenzodioxin, 0.04 µg./g.; a mixture of di-, tri-, and tetrachlorodibenzofuran, 0.02 µg./g.; two isomeric hexachlorodibenzodioxins, 0.02 µg./g.; octachlorodibenzodioxin, 0.01 µg./g.; and octachlorodibenzofuran, 0.01 µg./g.

According to preliminary work by other workers, the chlorinated dibenzodioxins do not occur widely in the environment. They have been detected, however, in certain poultry feeds and found responsible for hydropericardium in chickens (chick edema factor).

Chlorinated dibenzofurans have been detected in some commercial polychlorinated biphenyl preparations by other workers; but their presence in enrivonmental samples has not been studied. Quite possibly, the leakage of chlorinated dibenofurans into the environment is negligible.
[2 tables, 15 references] FTP

9.2 (1.85) THE HIGH-SEA SHRIMP RESOURCES OFF THE GUYANAS AND NORTHERN BRAZIL

Naidu, K. S., and L. K. Boerema (Fish Stock Evaluation Branch, Fishery Resources Division, Food and Agriculture Organization of the United Nations, Rome, Italy)
FAO Fisheries Circular No. 141, 18 pp. (March 1972) (Distribution restricted)(Food and Agriculture Organization of the United Nations, Rome, Italy)

The fishing area lies between the mouth of the Orinoco and the mouth of the Amazon off the northeast coast of South America. Shrimp are taken from within 50 to over 100 miles from shore in depths of 15 to 30 fathoms. Best catches are reported at 30 fathoms. The Continental Shelf drops off 50 miles from the coast of Guyana and extends further offshore in a southeasterly direction until the drop-off is over 100 miles from shore at the mouth of the Amazon. Strong northeasterly winds blow continuously from January to mid-April, and fairly heavy swells are normal to the area.

The most abundant species and the basis of the fishery is the spotted pink shrimp Penaeus brasiliensis. Other important species are the northern pink shrimp, P. duorarum, and the brown shrimp, P. aztecus. (The white shrimp, P. schmitti, which lives in shallow water are exploited by small trawlers from Trinidad.) The sea-bob shrimp, Xiphopeneus kroyeri, is extremely abundant along the coasts from Cape Hatteras, N.C., to Southern Brazil but is not exploited as it could be. It is estimated that the catch of this species could be increased from the current 3 million lbs. harvested by a factor of 10 or more. Among the species of shrimp inhabiting the deeper waters which may have commercial possibilities are Solenocera vioscai, Plesiopenaeus edwardsianus, and Hymenopenaeus robustus.

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9.2 UTILIZATION OF MARKET MECHANISM FOR PROMOTION OF FISH-PRODUCT SALES BY FISH-PROCESSING INDUSTRIES

Pędziński, Zdzisław (Institute for Exploitation of Marine Resources, WSR ul. Kazimierza Królewicza 4, Szczecin, Poland)
Zeszyty Naukowe 35, Rybactwo Morskie II, 227-238 (1971) (In Polish; summary in English) (Science Notes, Marine Fishery II, Higher School of Agriculture of Szczecinie, Szczecin, Poland)

The author analyzed the economics of the Polish fishery including application of management principles to marketing within the framework of the goals of the official policies of the Government. Good management promotes demand for fish products, adjusts production to correspond to demand, and sets prices and profits to provide for adequate returns on investment.
[7 references] Abstract by Jan Walczak modified by SW

9.3 THE DANGER OF WIDER FISHING WATERS

Anonymous
Fishing News International 11, No. 5, 15 (May 1972)

This editorial comment is critical of Iceland's views to claims to extended fishing limits as discussed in the 48-page booklet entitled "Iceland and the Law of the Sea." (The comment does not indicate where the booklet may be obtained but presumably it is available from the Icelandic Government offices in Reykjavik, Iceland.) FTP

9.2 (6.10) THE CURRENT STATE OF PRODUCTS LIABILITY LAW

Zietz, Morton K. (Zietz, Sonkin, and Radin, Providence, Rhode Island), in collaboration with Louis Baruch Rubinstein
Feedstuffs 44, No. 20, 48, 50, 52, 54, 136 (May 15, 1972)

A products liability claim is defined as "a demand for damages based on injury to persons or property arising from a situation or accident which involves goods or products, manufactured, distributed or sold by the person or firm from whom the damages are sought...."

Application of liability laws has been modified in recent times from the doctrine of privity to the concept of strict liability. The doctrine of privity maintains that there must be a contractual relationship between a person who suffered injury or damage to property and a person or company whose product, it is claimed, caused the injury or damage. With the purchase of a product a privity relationship is established between a consumer and the retailer only. If the consumer was injured or his property was damaged due to a faulty product, he could sue only the retailer for compensation. The consumer could not sue the distributor or manufacturer because he lacked privity with them.

The concept of strict liability is stated as follows: the seller of a product in a condition that is dangerous to the consumer or his property is subject to liability for injury or damage provided the seller is in business to sell the product and it reaches the consumer without a change in the condition in which it is sold. This rule applies, although the seller exercised care in preparation of

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9.3 (9.2) CONTROLLING GREAT LAKES POLLUTION: A STUDY IN UNITED STATES-CANADIAN ENVIRONMENTAL COOPERATION

Bilder, Richard B. (University of Wisconsin, Madison, WI 53706)
University of Wisconsin Sea Grant Program, WIS-SG-72-325, Reprinted from the Michigan Law Review 70, 469-556 (Jan. 1972)

This study deals with United States-Canadian cooperation with respect to problems of pollution of the Great Lakes. In June 1971, the two countries announced their intention to conclude a broad-ranging agreement designed to protect and enhance water quality in the Great Lakes and to bring the Great Lakes pollution problem under control by 1975. This article discusses the proposed Great Lakes Water Quality Agreement and the long history of developing United States-Canadian cooperation that preceded it.

The United States-Canadian experience may offer guidance for the solution of some of the specific problems that programs for international cooperation face, involving questions of framework and approach; institutional organization, function, and authority; determination of objectives; apportionment of burdens; coordination; and implementation. Also, the experience calls attention to the contribution that can be made by more limited bilateral and regional cooperative agreements. The experience, too, may serve to point out that the concept of international environmental cooperation has limitations as well as potentialities.

The author hesitates to generalize regarding the cooperative arrangements that the United States and Canada have developed; however, he believes some lessons have been derived, encouraging and discouraging, as follows: (1) Large-scale environmental problems are difficult to solve; (2) Many environmental problems are largely

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9.2 (6.10)

the product for sale, and the consumer has not bought the product from the seller, nor entered into a contractual relation with him.

The courts in almost all cases are applying the strict liability concept. However, the injured parties still have the burden of establishing the defect in the product and that the defect caused the injury. The best defense for a manufacturer who is sued for liability is to prove that there are causes, other than those claimed by the consumer, that could have caused the injury. Disclaimers of implied warranty are still useful to a seller but may not be considered favorably by the courts unless they are conspicuous, in large type, and in specific language on the sales forms that are given to the consumer. A selection of cases illustrating the points made by the author is included. SW

[4 references, 12 tables, appendix]

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9.2 (1.85)

INDUSTRIAL DEVELOPMENT AND THE COLLEGE OF MARINE STUDIES OPERATIONS IN LEWES, DELAWARE

Durr, Frederick R. E.
College of Marine Studies Publication No. 2BE-058, University of Delaware, Newark, DE 19711 (Mar. 1972), 60 pp.

The existence of shrimp lying off the coast of Guyana in quantities suitable for commercial exploitation was known by 1944. First large-scale operations were made from Guyana in 1959. Surinam had been engaged in the industry since 1956. Barbados and French Guyana entered the fishery by 1963. Trinidad began operations in 1966 followed by Brazil in 1969.

In the development of the fishery, data on catch and numbers of boats in the fleets were not reliable until 1964. The total boats in the fleets has increased from 100 in 1961 to 402 in 1969. Boat sizes have increased also. Total shrimp landings increased continuously from 3.9 million lbs. in 1960 to 27.3 lbs. in 1968 and declined to 27.1 million lbs. in 1969. The average catch per boat increased gradually to 79.4 thousand lbs. in 1965. With increases in numbers of boats, the annual catch per boat declined to 67.5 thousand lbs. in 1969. The highest catches for the Barbados, Guyana, and Surinam fleets occurred in 1966, and for the French Guyana and Trinidad fleets, in 1968. Size of catch fluctuated: low catches in January and February; an increase to a peak in April; followed by a decline to low levels in November and December. The size of shrimp declined during the period 1964-1969 in the catches of Guyana and Surinam; there was no change in shrimp size in catches of the other countries.

Based on estimates and imprecise data plus more consistent data when available, the indications are that catches per boat are declining and the catch of the whole fleet continues to increase but at a diminishing rate. These data are characteristic of high-level fishing, a situation which can result in a decrease in the average size of shrimp caught. Such a decrease has been reported in the catches of Guyana and Barbados. The data further suggests that a fair part of the shrimp stocks is being caught.

[7 figures, 6 tables, 6 references] SW

9.3 (9.2)

localized and must be handled primarily on a national basis, with international measures playing only a supplementary role; (3) Governments are reluctant to subject their flexibility and freedom of action regarding relevant environmental policies to international constraints; (4) The price of setting up agreements between or among any but the most strongly concerned countries may be an agreement that is watered down and ineffectual; (5) Governments often prefer loose cooperative arrangements to techniques of formal legal prohibition; (6) The possibilities for successful international cooperation on particular environmental problems may be enhanced by a formal acknowledgement of the international character of the problem and of the propriety of an international treatment; (7) International cooperation relative to environmental problems can yield useful dividends at relatively low costs and with limited political risks; (8) Some of the functions involved in international cooperation concerning the environment can best be performed by institutions acting in an expert or apolitical capacity; (9) Limited patterns of international cooperation in the environmental area may produce useful secondary effects; and (10) The problems of the pollution of the Great Lakes is similar in many respects to those in many other large lake areas of the world.

[288 footnotes]

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9.19 (9.15)

METHODOLOGY OF FISH STUDIES WITH REGARD TO THE ACTION OF WASTE WATER POISONS

Reichenbach-Klinke, H. H. (Zool.-Parasitol. Inst., Univ. Muenchen, Munich, Germany)
Chemical Abstracts 76, No. 13, 68989d (Mar. 27, 1972)

9.2 (6.10)

MARKET SHARE RESPONSE TO MARKETING ACTIVITIES IN THE FEED INDUSTRY

Funk, Thomas F. (Agricultural Economics, University of Guelph, Guelph, Ontario, Canada), and James C. Snyder (Agricultural Economics, Purdue University, Lafayette, IN 47907)
Feedstuffs 44, No. 20, 44, 136 (May 15, 1972)(Reprinted from Purdue Journal No. 4669)

Marketing activities include advertising, pricing, and distribution. By varying either activity in a mathematical model, market share response can be calculated.

[1 table] SW

9.2 MARKETING STRATEGY SELECTION IN THE FEED INDUSTRY

Funk, Thomas F. (Agricultural Economics, University of Guelph, Guelph, Ontario, Canada), and James C. Snyder (Agricultural Economics, Purdue University, Lafayette, IN 47907)
Feedstuffs 44, No. 21, 38, 40-41 (May 22, 1972)(Reprinted from Purdue Journal No. 4672)

A mathematical model was formulated whose main structure consists of pseudo-competitive sales areas. Each area is characterized by a distribution of sales among competing firms as well as by a set of parameters: number of distribution outlets; promotional expenditures; product price. To achieve an objective of the firm such as increased market share or higher profits, one or more of the three items may be modified in successive calculations to determine the best combination. The best combination provides a guide for the most effective actions to be taken by the firm to achieve its objectives.

[2 tables, 1 figure] SW

7.0 (0.11) ANALYTICAL CHEMISTRY 1972 REVIEW OF FUNDAMENTALS

Analytical Chemistry, Annual Reviews, 44, No. 5, 572 pp. (Apr. 1972)

This review edition is a survey of recent literature in the field of analytical methods and fundamentals. The subjects considered are Amperometric Titrations; Biochemical Analysis; Chemical Microscopy; Chromatography; Electroanalysis and Coulometric Analysis; Electrochemical Relaxation Techniques; Electron Microscopy; Electron Spectroscopy. I. Ultraviolet Photoexcitation; Electron Spectroscopy. II. X-Ray Photoexcitation; Electron Spin Resonance; Emission Spectrometry; Flame Spectrometry; Fluorometric Analysis; Functional Group Analysis; Gas Chromatography; Infrared Spectrometry; Inorganic Analysis; Ion Exchange; Ion Selective Electrodes, Potentiometry, and Potentiometric Titrations; Kinetic Aspects of Analytical Chemistry; Light Absorption Spectrometry; Magnetic Susceptibility. Instrumentation and Applications Including Lunar and Biotype; Mass Spectrometry; Microwave Spectroscopy; Mössbauer Spectrometry; Nuclear Magnetic Resonance Spectrometry; Nucleonics; Organic Elemental Analysis; Organic Polarography; Polarographic Theory, Instrumentation, and Methodology; Raman Spectrometry; Statistical and Mathematical Methods in Analytical Chemistry; Thermal Analysis; Titrations in Nonaqueous Solvents; Ultraviolet Spectrometry; Use of Enzymes in Analytical Chemistry; X-Ray Absorption and Emission; and X-Ray Diffraction. SW

9.3 (9.2) LIMITED ENTRY IN THE SALMON FISHERY: THE BRITISH COLUMBIA EXPERIENCE

Campbell, Blake A. (Canada Department of the Environment, Fisheries Service)
Pacific Sea Grant Advisory Program No. 6, Published by Fishery Programs Centre for Continuing Education, University of British Columbia, Vancouver, B.C., Canada (May 1972), 13 pp.

The author outlines briefly the evolution, program, and problems involved in the Salmon Vessel License Control Program in British Columbia, Canada.
[4 tables] FTP

9.6 NORTH ATLANTIC FISHERMEN: ANTHROPOLOGICAL ESSAYS ON MODERN FISHING

Andersen, Raoul, and Cato Wadel
Published by the Institute of Social and Economic Research, Memorial University of Newfoundland, St. John's, Newfoundland, Canada (1972), 174 pp. Price $5.50, clothbound.

This book is a collection of essays on the cultural relations of commercial fishermen from Newfoundland, Norway, Shetland, and Sweden. SW

9.3 RECENT PROGRESS IN THE CONSIDERATION OF FLAVORING INGREDIENTS UNDER THE FOOD ADDITIVES AMENDMENT. 5. GRAS SUBSTANCES

Oser, Bernard L. (Food and Drug Research Laboratories Inc., Maurice Ave. at 58th Street, Maspeth, NY 11378), and Richard L. Hall (McCormick & Co., 11350 McCormick Rd., Hunt Valley, MD 21030)
Food Technology 26, No. 5, 35-37, 40-42 (May 1972)

This article is the fifth in a series dealing with recent progress in the consideration of flavoring ingredients under the Food Additive Regulations for natural and synthetic flavoring substances [Code of Federal Regulations Title 21, Part 121, Sections 1163 and 1164. Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402]. It presents additions to the list of GRAS (generally recognized as safe) substances made in 1970-1971. A table showing the average maximum use level of each substance is given. The authors explain the concept of "toxicological insignificance." Data on the total daily per capita intake of flavoring substances are given. Based on the exaggerated assumption of the daily ingestion of average portions of all classes of flavored foods and the presence of 10 p.p.m. of flavoring agent in each of them, they estimate that the total daily intake would reach 11.5 mg. or only 0.164 mg. per kg. body weight.
[1 table, 12 references] FTP

9.6 (9.17) BIBLIOGRAPHY OF LITERATURE: PUGET SOUND MARINE ENVIRONMENT

Collias, Eugene E., and Alyn C. Duxbury (Department of Oceanography, University of Washington, Seattle, WA 98195)
Washington Sea Grant Publication No. WSG 71-6, 307 pp. (Dec. 1971) (Department of Oceanography, University of Washington, Seattle, WA 98195)

This bibliography contains 1,270 entries. Each entry is coded with one, or more, 13-digit code words. The entries are arranged in major divisions defined by the subregions (27) of Puget Sound to which they pertain. Within these major divisions, the entries are arranged by data classification and sorted chronologically by author. The data classifications consists of 15 groups as follows: Geography; Climatology; Hydrology; Geology; Hydrography; Physical Oceanography; Chemical Oceanography; Biological Oceanography; Biology (other than marine); Water Pollution and Waste Disposal; Pollution, Land and Air; History; Planning; Other; and Bibliographies. There are two appendices: the first lists the entries pertaining to each drainage river basin (7) categories) and the second lists the entries according to land or water use (13 categories). FTP

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--	24	9.2
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Garrett, William R.	3	0.8
Gheorghe, Vasile	2	0.4
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--	13	7.81
Goftarsh, M. M.	10	3.15
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--	1	0.321
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Johnson, Donald E.	2	0.4
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--	12	4.2
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--	9	3.15
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--	1	0.321
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-- James C.	24	9.2
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--	5	2.116
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